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THE NEW PRODUCT

Every supervisor and shop teacher is confronted from time to time with the necessity of deciding whether to accept or to reject a new product which some enthusiastic salesman with initiative and imagination is promoting for school use. Some of these products, unfortunately, live but for a month or two and then die from lack of real merit.

Quite recently the publisher of INDUSTRIAL ARTS AND VOCATIONAL EDUCATION addressed a letter to the directors of vocational education throughout the United States, discussing this problem of new products. One of the many replies which we received reads as follows:

> The whole matter of buying is very important from the standpoint of the industrial-education teacher who desires to act in a highly ethical as well as a business manner. Your magazine can well assume considerable responsibility in investigating the reliability of advertisers; the teachers and school people could coöperate if any violations of good practice were engaged in by notifying you.

The foregoing is the reflection of the mind of a very important director of vocational education who is confronted with the problem of deciding on a new product not less than once each day of the school year. His attitude shows that the problem of the new product is one of the most serious that confronts the school buyer.

THE PUBLISHER

CURRENT COMMENTS

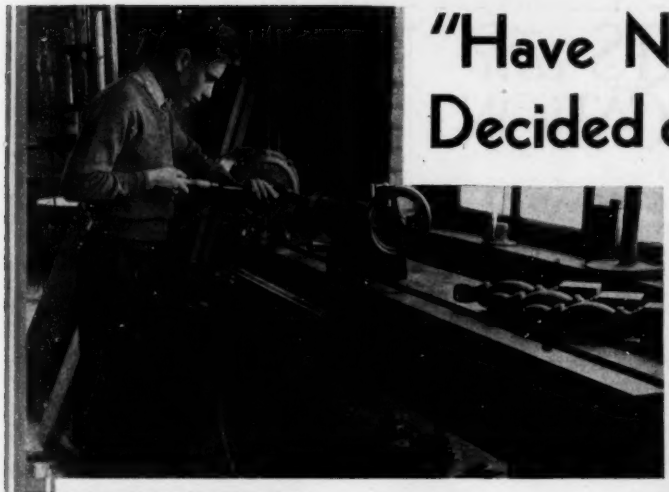
Under this heading Dr. Homer J. Smith is commencing a series of short discussions of controversial subjects. These will appear from time to time in our Magazine. His object in writing them is to arouse thought and discussion. Do not fail to read the first one which appears on page 177 of this issue.

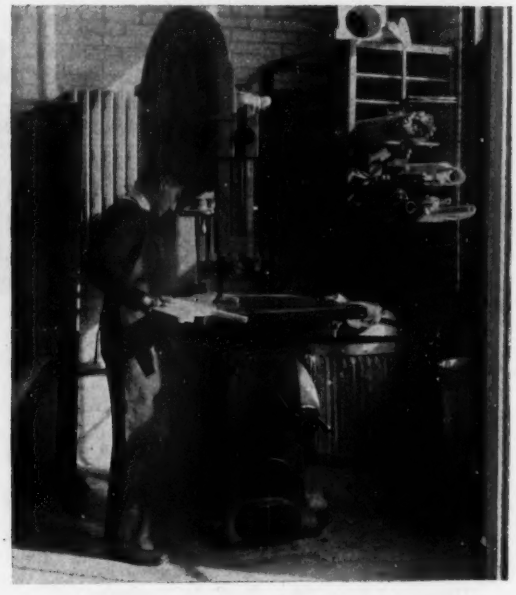
THIS MONTH'S COVER

The picture used for our cover this month shows an ingot charging machine in the act of placing ingots into the heating furnace.

Photograph by Publishers' Photo Service, New York.

"Have No Regrets that We Decided on Yates-American"





TOP
A student in the Glassboro schools operating a Yates-American No. 12 Speed Lathe.

ABOVE
A B-11 Hand Jointer in operation in the Glassboro schools.

RIGHT
A student of the Glassboro Manual Training department operating a Yates-American Y-30 Scroll Band Saw.

So says Mr. Rodgers, supervising principal of the Glassboro Public Schools, Glassboro, New Jersey. And Mr. Rodgers says further that, "Our instructor, Mr. Ingham, has only the highest praise for the equipment and I know that, as he continues to use it, he will grow to like the machines even better."

Yates-American machines for school use are safe for the inexperienced to operate, are accurate to the highest degree, and are extremely durable. Further, they give the "real thing" slant to the school shop, which so many boys are quick to appreciate, because they are the same types as used industrially. These are reasons why schools, in ever increasing numbers, are specifying and using Yates-American machines, and, "as they continue to use them, like them even better."

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INDUSTRIAL ARTS and VOCATIONAL EDUCATION

Volume 20 MAY, 1931 Number 5

Equipping and Maintaining Industrial-Arts Departments in a Large City School System

*A. G. Bauersfeld**

THE problem of purchasing equipment in a small school system is comparatively easy and direct. When there is need for tools or supplies, requisitions submitted by a teacher are generally approved by the school board because the teacher is hired as a technical expert and the maintenance of his shops and drawing rooms is part of his routine duties. This, however, is not the case with a teacher who is part of a city school system employing 13,000 teachers who take care of 550,000 pupils, and where the annual budget of expenditure exceeds $96,000,000. Under such conditions one will usually find an elaborate system developed over a period of years — a system which must supply the needs of the many, and at the same time safeguard the purchase of each supply item, in order to obtain good quality at the lowest competitive price. The so-called "red tape" of a large city school-business department is really a system of "check and double check" in order that a uniform quantity and amount of supplies may reach each classroom, shop, or laboratory on scheduled time in accordance with established standards. Standardization may mean lack of freedom of action and choice to the individual, but in a large school system, it is a necessary and an efficient method of procedure, involving careful and economic expenditure of funds.

The Chicago Board of Education operates under the statutes of the Otis Law of the State of Illinois. The work of this school board is carried out through three coöperating units; namely, the school-administration division, the legal division, and the business division.

The educational-administration division, under the direction of the superintendent of schools, makes recommendations as to the type and location of schools and the equipment needed. The personnel of the educational-administration division includes the assistant superintendents, district superintendents, directors of special subjects, supervisors, principals, and teachers. In accordance with the Illinois State Educational Tax levies, each year the superintendent of schools submits to the board of education, a budget of financial needs which is divided into two general headings; items charged to the school-building or permanent fund, and items charged to the educational fund. The permanent fund provides for new buildings, repairs, built-in fixtures, and heavy machine equipment. The educational fund provides for salaries, supplies, apparatus, furniture, and small tools. The directors of special subjects are called upon by the superintendent of schools to prepare specifications for equipment for new schools, standardizing lists of supplies, courses of study, and reports on supervision.

The business department, under the direction of the business manager, and consisting of the bureau of purchases, bureau of supplies, bureau of audit, bureau of architecture, and bureau of engineering, is responsible for the designing, purchasing, and delivering of the school plants, equipments, and supplies which were recommended by the superintendent of schools. The recommendations of the superintendent of schools and the projects of the business manager are subject to the approval of the board of education. This body meets biweekly and approves or rejects various reports submitted by each division.

Four-year technical courses for boys are given in three technical high schools and six coeducational senior high schools. Elective industrial-arts courses are offered in 14 other high schools and are required in the 25 junior high schools. The Chicago junior-high-school movement was started five years ago, and when completed will require at least 80 junior high schools. In addition, at least one or two new senior high schools will be needed each year to complete the 6-3-3 program of pupil classification.

*Director, Technical Work, in the Chicago High Schools.

Standardization of equipment has kept pace with this program and has required repeated revisions to meet changing needs. Committees of directors and teachers of special subjects are called upon by the superintendent of schools to prepare reports on anticipated needs.

Technical education is necessarily more expensive than academic education, because the first deals with machines and materials, while the second deals largely with books. The total investment in the technical departments of the Chicago high schools for machinery, equipment and its upkeep and the cost of supplies consumed is necessarily large because of the growing demand from year to year for more practical-art courses. This demand on the part of parents and children in all sections of Chicago for more technical work has been generously met by the board of education. Conservative growth based upon a real need, the purchase of good substantial equipment, eternal vigilance against extravagance and oversupply are the guiding factors which have controlled the installation of all shop equipment during the past years.

Table I shows the approximate cost allowed for standard equipment in the senior and junior high schools of Chicago.

TABLE I. Approximate Cost of Standard Equipment in the Senior High Schools

	Pupils per Day	*Educational Fund**	*Permanent Fund*
Auto Shop	120	3,000	3,600
Electric Shop	120	2,000	7,000
Forge Shop	120	1,200	13,000
Foundry	120	2,000	10,500
Machine Shop	100	2,500	30,000
Printing	120	2,361	4,339
Woodworking	120	2,800	9,350
Mechanical Drawing	288	400	8,000
Junior High Schools			
Electric Shop	150	1,200	4,700
Printing	150	1,300	3,700
Sheet Metal	150	500	2,375
Woodworking	150	1,800	5,100
Mechanical Drawing	200	300	5,000

*The educational column includes supplies which will be needed to carry out the course of study for one year. The supplies for the following years will be furnished on the per-capita basis of the schools' budget.

Although the tendency in a large school system is toward standardization, nevertheless in order to have life and growth, flexibility and changes required by growing needs must be provided for. Just at present there are a number of committees at work planning the equipment for the new $6,000,000 Lane Technical High School plant. A school of this kind requires the latest and most practical types of equipment. It is necessary, therefore, to make estimates not only from experience within the school system, but also to take into account what other metropolitan cities have done and are doing with similar projects.

If a man builds a new house for $20,000, he will not be able to limit his furnishings to $500, because the furniture must be in keeping with the major part of his investment. This logic applies with equal force to the equipment that must be bought for a school plant costing millions and which is planned to take care of 7,000 day-school pupils. Such a requirement does not excuse extravagance, but it does demand efficient, sturdy machine tools that will give years of satisfactory use.

Machine tools are generally divided by industry into three classes; namely, A, B, and C. The A-class machines are considered as precision machines for toolroom service. The B-class machines are used for general production purposes, while the C-class machines are ofttimes of light weight, not so sturdy, but purchased where low initial cost is a necessity. The machine shops in the Chicago high schools have generally been equipped with B-class tools, because 35 years of experience has proved that efficient, sturdy tools are the most economical in the hands of boys.

Every effort is made to make specifications so broad and exact that they will eliminate a monopoly and will permit of impartial competition within the classification described. In the advertisement for bids on hand tools or supplies, if a particular brand is specified it is always followed by the words "or equal," thereby permitting other manufacturers to offer their products in competition with the brand named as a standard.

A standard list of supplies and hand tools has been perfected for the technical course through the coöperation of various committees of teachers. The board of education supply warehouse has sufficient stock on hand to fill requisitions for items on the standardized lists which are ordered monthly by the principal of each school. The ability to purchase standardized articles in quantities and the elimination of small individual purchases for each school, has resulted in a great saving of time and money for the board of education.

In order to keep an adequate supply of stock on hand at the warehouse for the required needs of all of the school shops and drawing rooms, a large investment is necessary, amounting at times to as much as $160,000. Table II shows the number of different items listed in the stock book for technical supplies.

TABLE II. Supplies and Small-Tool Equipment for High Schools — Carried in Stock at Supply-Department Warehouse and Chargeable to the Educational Fund

List	*Number of Items*
General Metals, including auto, electrical, forge, foundry, and machine shop	826
Art, including free-hand and mechanical drawing	182
Printing	214
Woodworking	478

The per-capita allowance per pupil enrolled, shown in Table III, has been worked out for the yearly budget of each technical study. This permits the teacher and principal to determine how much money is available for the maintenance of each shop and drawing room.

In accordance with this per-capita allowance a teacher of woodworking in the high schools with 120 pupils daily is allowed $480 each year with which to requisition lumber, supplies, and small tools. The method of procedure after the annual budget is passed is to present to the principal, not oftener than once a month, a list of the necessary items carried at the warehouse. A stock-supply requisition is then made out, signed by the principal, and sent to the supply department where the items are priced. A copy of the requisition then goes to the bureau of audit and the total cost is charged against the budget allowance for that school. If sufficient funds remain in the account of that particular school, the requisition is approved, and the supplies delivered to the school on the schedule delivery of supply-department motor trucks.

TABLE III. Budget Allowance for Technical-Work Maintenance Per Pupil Per Year

Auto Mechanics	$2.70	Two periods a week	.23
Electrical Construction		Five periods a week	.55
First Year	2.60	Ten periods a week	.85
Second Year	2.60	Mechanical-Drawing	
Third Year	4.00	Instruments	.20
Forge	3.40	Patternmaking	2.70
Foundry	3.40	Printing	2.70
Machine Shop	4.00	Woodworking	
Mechanical Drawing		First Year	4.00

Special purchases of educational supplies and of all permanent-fund equipment require a more complicated procedure. First, there must be a good reason for deviating from the standard set. Next, a special requisition must be prepared, approved by the director of purchases and economy, and finally by an assistant superintendent. The requisition is then sent to the business manager, passed on by the auditor and sent to the bureau of purchases. Here the goods specified by the requisitions are listed on quotation sheets which are sent out to commercial firms for competitive bids. The returned bids are scheduled and sent to the superintendent's division for advice. The director of purchases consults with the shop teacher on the schedule of bids and an advised selection is made and the marked schedule of bids returned to the business manager. If the contemplated purchase exceeds $500, board-of-education authority for the expenditure of this amount must be obtained. The board of education subsequently either approves or sends the request to a special committee for investigation. After such a report is released, the purchasing department issues an order, the goods are delivered to the school, and finally a voucher check is issued by the bureau of audits for the payment of same.

The purchase of special items in a large school system is a laborious task and therefore individual teachers are urged to conform as closely as possible to the standard lists. Requisitions for the purchase of complete permanent equipment for new schools are prepared by the directors of purchases and economy through conference with the directors of special subjects and the principal of the school. Standardized lists of equipment for the different shops and drawing rooms have been developed with complete specifications for the various machine tools required. These equipments, when purchased and installed, offer complete facilities for teachers and pupils to plan many interesting projects in the field of industrial-arts education.

Planning a School-Building Program

*Harold J. Van Westrienen**

MANUAL-arts or vocational-education work is usually placed into any room that happens to be left over after the other departments of the school are adequately housed. Wiring, lighting, the kind and amount of equipment, courses of study, etc., must then be adjusted to the room, which in most cases is wholly unsuited to the work and far inadequate in every respect.

Although much progress has been made in school planning, the special departments, such as the vocational, are still treated as orphans during building expansions. The author therefore purposes in this article to present a logical, adequate, and educationally sound procedure for planning a building program. The emphasis will be placed upon the needs of the industrial-arts or vocational department, although frequent reference will be made to school-building planning in general.

*Director Vocational Education, Hamtramck Public Schools, Hamtramck, Michigan.

Preliminary Steps in Planning a Building

I. *A Philosophy of Education*

Any worthy undertaking, if it is to succeed, must have its goal. Education cannot accomplish its purpose unless it is guided by an adopted philosophy, and this philosophy must be basic to the planning of a building program. To show how this may be done, the Hamtramck situation is taken as a basis.

"The purpose of public education in Hamtramck shall be to develop individuals who can live successfully in a democracy. Successful living means that: (1) they must be able to see the problems in their own and the social life; (2) they must be able to solve these problems successfully, and (3) they must will to take the necessary steps to achieve the solution.

"An analysis of successful living shows that there are six major fields of problems. These are: (1) health; (2) ethical

character; (3) citizenship; (4) vocational activity; (5) home membership, and (6) recreation.

"In each of these fields it shall be the policy to make the child acquainted with the present-day problems, with a knowledge of the achievement and methods of solution developed by man in the past, and with the needs and possibilities of the future.

"The methods used to achieve these objectives shall be those which will develop in the child in the largest measure: (1) the ideals of worthy individual and social purposes; (2) powers of self-direction, self-appraisal, and self-control; and (3) desire and ability to work coöperatively with others in the solution of social problems."

II. *Curricula and Courses of Study*

The second preliminary step in planning is the adoption of curricula and courses of study. These are dependent to a large extent upon the philosophy under which the school system is working. A survey of local social and industrial conditions forms a basis for the various curricula.

TABLE I
Curricula and Time Distribution by Subjects
Junior High School, Hamtramck, Michigan
(Fifty-eight minute Recitation Periods Per Week)

Division and Subjects	7th Grade		8th Grade		9th Grade				
	B	A	B	A	General	Industrial	Commercial	Music	Homemaking
HEALTH									
Gymnasium	4	4	4	4	4	4	4	4	4
Hygiene	1a	1a	1a	1a	1a	1a	1a	1a	1a
Swimming	1a	1a	1a	1a	1a	1a	1a	1a	1a
Totals	5	5	5	5	5	5	5	5	5
LANGUAGES									
English and Literature	5	5	5	5	5	5	5	5	5
Foreign Language					5				
Totals	5	5	5	5	10	5	5	5	5
EXACT SCIENCE									
Mathematics	3	3	3	3	3	3	3	3	3
General Science	2	2	2	2	2	2	2	2	2
Totals	5	5	5	5	5	5	5	5	5
SOCIAL STUDIES									
History	5	5	5	5					
Civics					5	5	5	5	5
Totals	5	5	5	5	5	5	5	5	5
FINE ARTS									
Auditorium	2	2	2	2	2	2	2	2	2
Music	2	2	2	2	2	2	2	2	2
Art	1	1			1e	1e	1e	1e	1e
Public Speaking			1	1	1e	1e	1e	1e	1e
Printing					1e	1e	1e	1e	1e
Totals	5	5	5	5	5	5	5	5	5
VOCATIONAL (Boys)									
Blue-Print Reading	4b								
Woodworking and Model Airplane	4b					5c			
Bench Metal		4b				5c			
Printing		4b				5c			
Mechanical Drawing			4b			5c			
Home Mechanics			4b			5c			
Auto Mechanics				4b		5c			
Machine Shop				4b		5c			
VOCATIONAL (Girls)									
Foods	4								A/2c
Clothing		4							A/2c
Personal Hygiene									B/2c
Home Nursing and Child Care			4b						
Home Planning and Care and Interior Decorating			4b						
Jr. Bus. Training				4d			B/2c		
Bookkeeping				4d			A/2c		
Shorthand				4d					
Typing				4d					
Music (Vocal)								5c	
Music (Instr.)								5c	
Vocational Information	1e	1e	1e	1e					
Totals	5	5	5	5	5	5	6	5	5
Grand Total	30	30	30	30	30	30	30	30	30

Legend: (a) Once every two weeks (b) Ten-week units (c) Electives (d) Five-week units (e) One period in vocational tryout courses devoted to vocational information

The modern school program will probably contain a curriculum for the junior high schools which provides for a series of tryout courses in mathematics, science, language, commercial, homemaking, and other subjects as well as for those in the industrial field.

The exclusive residential cities will no doubt provide for a college-preparatory curriculum in the senior high school, with an allowance for industrial arts, but no vocational work. On the other hand, the industrial community will provide for several curricula in the senior high schools.

The modern cosmopolitan high school will probably offer in addition to the college-preparatory curriculum, one in commercial education, one in industrial education, one in homemaking, and one in all-day trade, all providing for graduation with a high-school diploma. In recent years the coöperative trade curriculum also is becoming very popular in industrial centers.

Table I shows one way of setting up the curricula preliminary to planning a building. This curricula has been adopted by the Hamtramck board of education as a program for the junior high schools.

Modern society has placed more demands upon the individual than can be provided for in any one curriculum with its courses of study. Therefore, courses and subject matter should be selected on a basis of individual and social needs to the size of the school unit, costs, etc. The process is so technical that only a mere mention of it can be made now. The thoughts in the following quotation should be kept in mind: "Subject matter determines the knowledge and skills acquired as a result of any given experience. Method determines the attitudes and ideals developed. Method is more important than subject matter because the effects determined by method are of more lasting and universal value."

With the curricula as a basis, specific courses that are to be taught under each curriculum must be, at least briefly, outlined. The course of study in each case will indicate the nature of the objectives, supplies, equipment, projects, etc., that must be known before an adequate building can be planned.

III. *School Membership Survey*

A careful survey of the past and present school enrollment in connection with a study of the general character and growth of the city will make it possible to predetermine approximately the future growth in school population. Unless this planning is undertaken the new building may prove to be inadequate or far in excess of future needs.

TABLE III

Proposed Shop Schedule

Shop and Periods	1	2	3	4	5	6
Drawing Room	7B B.P.R.	7B B.P.R.	Trade Drawing	9th Elective	8B Draw.	8B Draw.
General Shop	7B Wood	7B Wood	7A Metal	7A Metal	8B M.Mech.	8B Home Mech.
Machine Shop	8A Machine	8A Machine	9th Elective	All Day Trade	All Day Trade	All Day Trade
Auto Shop	8A Auto	8A Auto	9th Elective	All Day Trade	All Day Trade	All Day Trade
Printshop	9th Elective	9th Fine Arts	7A Print.	7A Print.	9th Fine Arts	
Proposed Homemaking and Commercial Schedule						
Foods Lab.	7B	7B	7B	7B	9th Elective	9th Elective
Clothing Lab.	9th Elective		7A	7A	7A	7A
Home and Child Care	8B	8B	9th Elective		8B	8B
Typing (20)	12-8A 8-9th	12-8A 8-9th	12-8A 8-9th	12-8A 8-9th	20 - 9th	20 - 9th
Business Training	34-8A	34-8A	34-8A	34-8A	45-9B	45-9B
Bookkeeping	15-9A	15-9A	15-9A	15-9A	15-9A	15-9A
Total Commercial	65-70	65-70	65-70	65-70	80	80

TABLE II. Vocational Classification for Copernicus Junior High School

Number			*No. Periods*
	Boys		
(330–368)	7th grade (8 classes of 41–45 each)		
	2 classes 7B Blue-Print Reading		
	2 classes 7B Woodworking		
	2 classes 7A Printing		
	2 classes 7A Bench Metal Working		
(330–368)	8th grade (8 classes of 41–45 each)		
	2 classes 8B Drawing		
	2 classes 8B Home Mechanics		
	2 classes 8A Auto Mechanics		
	2 classes 8A Machine Shop		
(107–17%)	9th Grade (Elective)		
	1 class Machine Shop (Trade)	(25)	3
	1 class Machine Shop	(45)	1
	1 class Auto (Trade)	(25)	3
	1 class Auto Shop	(45)	1
	1–2 classes Printing Trade or Ind. Arts or Fine Arts	(25–45)	4
	1 Trade Related Drawing	(25)	1
	1 Drawing	(45)	1
	Girls		
(330–368)	7th Grade (8 classes of 41–45 each)		
	4 classes 7B Foods		
	4 classes 7A Clothing		
(330–368)	8th Grade (8 classes of 41–45 each)		
	4 classes 8B Homemaking		
	4 classes 8A Commercial		
(106–17%)	9th Homemaking (Elective)		
	1–2 classes 9th Foods	(25–50)	
	1–2 classes 9th Homemaking	(25–50)	
(190–30%)	9th Commercial (Elective) 1/3–3 yr. and 2/3–4 yr.		
	2 classes 9B Elementary Business	(90)	
	6 classes 9A Bookkeeping	(90)	
	6 classes 9B and 9A Typewriting	(60–65)	

IV. *Schedule of Classes*

An analysis of the curriculum and courses in terms of the anticipated enrollment provides the basis for arriving at the number of rooms of each type that will be required to house the various departments.

The data shown in Table II were used in building the schedule for the new Copernicus Junior High School which is now in the process of construction. The tentative schedule is shown in Table III.

The proportion of students electing the various curricula cannot always be accurately predetermined because of the influence exerted by strong teachers or because of the negative influence of weak teachers. However, experience will allow for a fairly adequate basis for deciding upon the amount of space needed for each course which will be much more accurate than the usual guess.

V. *Machines, Tools and Other Equipment*

After a decision is reached as to the subjects that will be taught, and the approximate enrollment to be expected, the next step is to determine the equipment that must be provided for in each room. Equipment, especially that of an industrial character, requires considerable floor space. Unless the requirements are definitely anticipated adequate floor space will not be available. The kind, size, and shape of machines, location of power or other service outlets, as well as the working space required for each machine should be carefully determined.

Although tools do not require the space needed for machinery, they do require special consideration when planning a building, therefore a complete list of tools required for each subject should be kept in mind as one of the preliminary steps.

VI. *Class Projects*

The loss and damage done to work upon which the student is engaged, is one of the most distressing problems confronting the special teacher. This loss is due in a large part at least to a lack of proper facilities for the safe-keeping of projects. A careful analysis of what the boys will make, in addition to a well-thought-out plan for administering the shop, will make it possible to provide an adequate storage space for the projects which are in process of completion.

VII. *Selection of Location*

The selection of a school site is to a large extent a matter of statistics. Unless the cost of property is prohibitive, the school should be located so that it is near the center of the school population it will serve. Consideration must also be given to problems of traffic. The site will be referred to later in connection with the preliminary scale layouts.

PLANS AND SPECIFICATIONS

I. *Preliminary Rough Sketches*

After the schedule as shown in Table III has been prepared, the necessary data for proceeding with the actual drawing of the building plans are at hand. Rough sketches of the building showing the approximate location of each room should be made first. This sketch should contain the approximate size and shape of the building. A mental picture can then be drawn of the numerous problems and techniques that must be considered in connection with the administration of the building.

This first sketch will be based upon the estimated size of each room. Standards of building construction which involve structural, lighting, and heating factors have placed some limits within which the designer must confine himself. Steel and brick piers that support the building are placed approximately 15 ft. apart. This allows rooms to be 15, 30, 45, or 60 ft. in length. The width of the room is determined by the ceiling height which limits the window lighting area. The generally accepted width for classrooms with a 12-ft. ceiling is 22 ft. In a one-story building where skylights can be used, or in special buildings devoted to industrial work, greater widths may be adopted under certain circumstances.

Keeping the above factors in mind it is possible to tentatively set the size of each room. With the modern

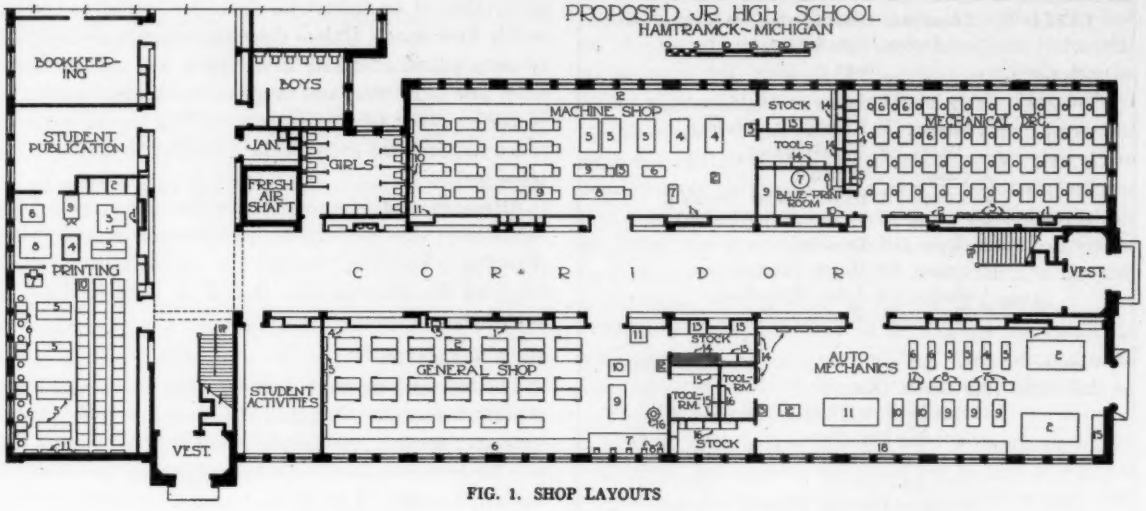


FIG. 1. SHOP LAYOUTS

Mechanical-Drawing Room

1. Sink
2. Instruction Books
3. Display Panels
4. Supply Cabinet
5. Units
6. 28" by 35" Drawing Tables
7. Blue-Print Machine
8. Washer
9. Trimming and Cutting Bench 36" by 72"
10. Cupboard

Auto-Mechanics Shop

1. Sink
2. Running Chassis
3. Front Axle
4. Live Axle
5. Half-Floating Axles
6. Full-Floating Axles
7. Transmission
8. Steering Gears
9. Running Motors
10. Dead Motors
11. Cutaway Chassis
12. Cutaway Transmission
13. Tool Grinder
14. Display Panels
15. Welding Bench
16. Cabinets
17. Cutaway Steering Gears
18. Workbench

General Shop

1. Sink
2. Woodworking Benches
3. Flush Tank
4. Lockers
5. Display Panels
6. Workbench
7. Soldering Bench
8. Gas
9. Machine Bench
10. Squaring Shears
11. Band Saw
12. Tool Grinder
13. Shelves
14. Pipe Rack
15. Cabinets
16. Revolving Machine

Machine Shop

1. Sink
2. Gas Forge
3. Tool Grinder
4. Shaper
5. Milling Machine
6. Drill Press
7. Hack Saw
8. Engine Lathe
9. Lathes
10. Display Panels
11. Lockers
12. Workbench
13. Steel Rack
14. Cabinets

Printshop

1. Sink
2. Cabinet
3. Power Cutter
4. Imposing Stone
5. Composing Stands
6. Type-Case Stands
7. Proof Press
8. Press
9. Pressroom Cabinet
10. Armchairs
11. Display Panels

class of 35 to 45 pupils a 22 by 30-ft. academic room is adequate, while the shops and special laboratories will vary from 45 to 60 ft. in length, depending upon the nature of the equipment.

A 15-ft. unit between two adjoining shops will ordinarily provide adequate space for tool cribs and stockrooms.

Other units such as school offices, stockrooms, corridors, washrooms, etc., must be considered in relation to the classrooms as they affect the passing of classes and other administrative factors.

Where the ground plot for the building is restricted in size, the dimensions and shape of the building plan will necessarily also be limited. Of course, much more satisfactory schools, from an architectural and administrative standpoint, can be designed if there is no restriction on the ground area. In new sections of a city it is much easier and cheaper to obtain the necessary land in the proper location than in older built-up sections.

The site that is selected and the character of surrounding buildings are important in the designing of the exterior architectural features of a school, but this is outside the scope of this topic.

II. *Preliminary Scale Drawings*

The preliminary scale drawings will give the first true picture of the shape and proportions of the proposed building. All rooms will be drawn to correct scale in true relation to each other. From these scale drawings the architect can give a fairly accurate estimate of the total cost of the building so that a decision can be reached as to the financial requirements that must be met before the building is completed. Where funds are limited this is a very important factor and may save disappointment and embarrassment at a later date.

After the room partitions and the general shape of the building has been included in the layout, the equipment should next be given consideration. With the previously determined list of equipment as a basis, the major items should be located within their respective rooms, keeping in mind the working area required, relation of the items of equipment to each other, and safety factors. This can be done most easily by the use of paper templates which represent the scale size of the machine or bench. The templates can be moved about until the most economical and practical arrangement is arrived at. After a tentative decision has been reached the equipment can be drawn in on this tentative scale drawing.

Upon the completion of the preliminary scale layout of the building and equipment, the entire drawing should be checked in relation to the schedule represented in Table III. A check on the equipment list and the plan for the administration of the building may reveal errors or points that had not been considered previously. Adjustment can then be made on the preliminary drawing until every item appears to have been satisfactorily adjusted.

III. *Detail Building Plans*

When all items have been adjusted on the tentative scale layout, working plans may be drawn. The location of supporting piers, heating ducts, plumbing installations, and other similar items will be indicated in addition to those included in the previously drawn preliminary scale layout. If these have been kept in mind previously, they should not conflict in any way with the room equipment.

After providing for the doors, windows, registers, lighting, heating, and telephone control panels, etc., there will still be considerable wall space available for built-in features. A careful study of the additional needs of each classroom will reveal the proportionate amount of this wall space

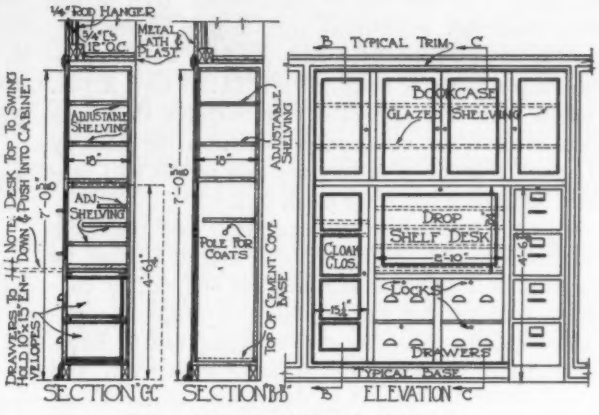


FIG. 2. SPECIAL TEACHER'S CABINET

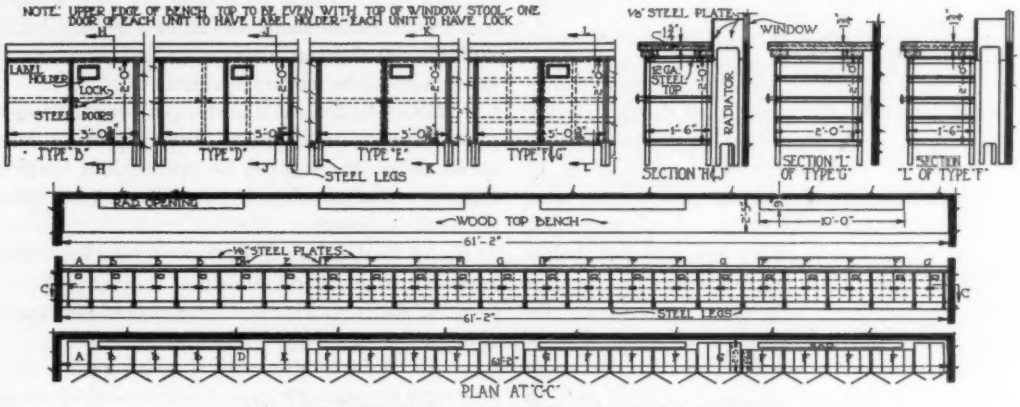


FIG. 3. MACHINE-SHOP WORK-BENCH AND PROJECT LOCKER

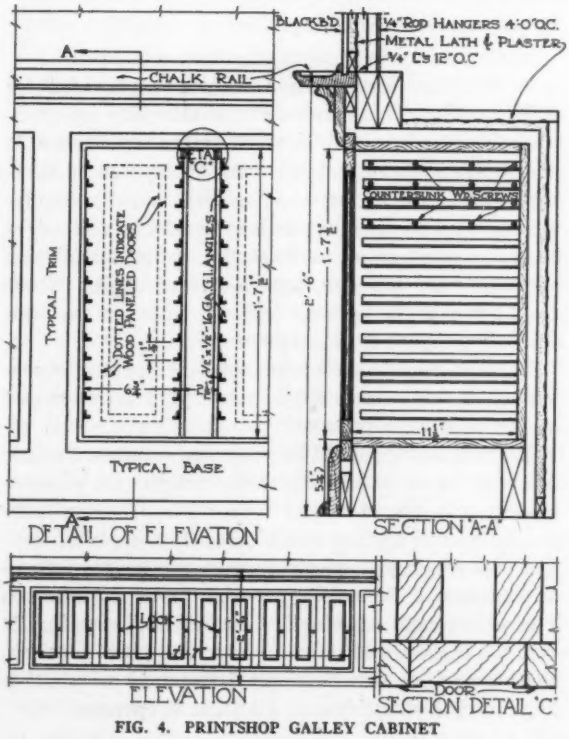


FIG. 4. PRINTSHOP GALLEY CABINET

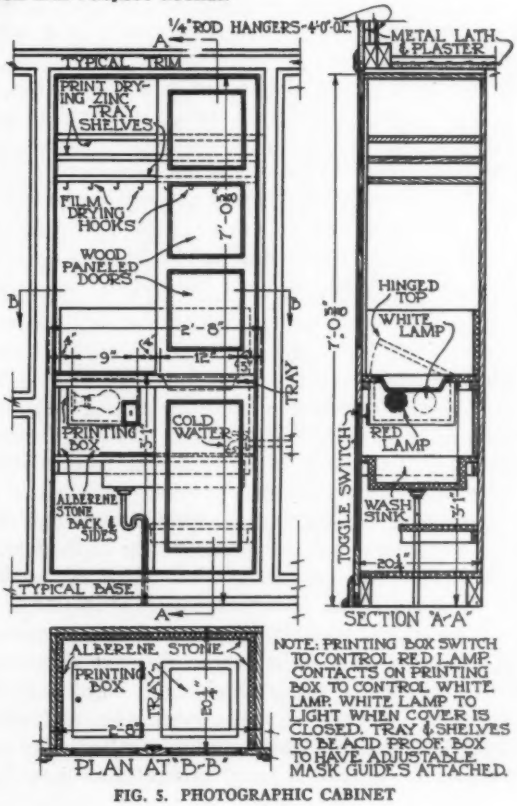

¼"ROD HANGERS-4'-0" O.C.
METAL LATH & PLASTER
TYPICAL TRIM
PRINT DRYING ZINC TRAY SHELVES
FILM DRYING HOOKS
WOOD PANELED DOORS
HINGED TOP
WHITE LAMP
RED LAMP
TOGGLE SWITCH
WASH SINK
PRINTING BOX
COLD WATER
TRAY
ALBERENE STONE BACK & SIDES
TYPICAL BASE
SECTION "A-A"
ALBERENE STONE
PRINTING BOX
TRAY
PLAN AT "B-B"
NOTE: PRINTING BOX SWITCH TO CONTROL RED LAMP. CONTACTS ON PRINTING BOX TO CONTROL WHITE LAMP. WHITE LAMP TO LIGHT WHEN COVER IS CLOSED. TRAY & SHELVES TO BE ACID PROOF. BOX TO HAVE ADJUSTABLE MASK GUIDES ATTACHED.

FIG. 5. PHOTOGRAPHIC CABINET

that should be devoted to blackboards, built-in file cases, bookcases, wash sinks, cork display boards, etc. Most modern schools have thick corridor walls to provide ample room for built-in items of this sort. A 3-ft. corridor wall will also allow for swinging the doors open without having them project into the hallway to obstruct traffic. The corridor side of the wall provides additional space for cloak lockers.

With the location of all equipment and plumbing installations, and built-in fixtures, attention must be drawn to such things as lighting, gas and electric convenience outlets for machines or miscellaneous appliances; exhaust fans for the soldering bench, forge, woodworking machines, and the paint spray room; and air outlets for the auto shop, paint guns, and for cleaning machines.

Examples of detailed plans for the vocational units are shown in Figure 1.

IV. *Detail Cabinet Drawings*

In view of the fact that few architectural firms maintain a school specialist, the school staff should provide accurate drawings of specifications for special cabinets that are needed for the storage of material, filing of projects, administration of tool equipment, etc. This phase of the work provides a means of utilizing what is ordinarily waste space under benches and below blackboards, to provide the much-needed storage space for projects and supplies. In the new Hamtramck Junior High School printshop, galley cabinets will be built into the wall below the blackboard. The space below workbenches will contain specially built-in steel cabinets for the storage of classroom projects. Other similar features are to be found in most of the more modern schools.

Examples of cabinet details are shown in Figures 2, 3, 4, and 5, which represent a special teachers' unit, a workbench, project locker, printshop galley cabinet, and a photography unit respectively. Each cabinet was designed to serve a definite purpose and will not be found in the average school. Of course, with the adaptable steel cabinets now obtainable, it may be quite an easy matter to use some of these instead of the wood cabinets.

V. *Specifications*

The major part of the specifications refer to the quality and kind of materials that should go into the actual construction of the building itself, and are the sole responsibility of the architect except as he is advised by the school administrator.

There are several items in the specifications that will have to be considered the responsibility of the school officials, however, because of their close connection with the educational factors involved. Such things as power control of machines, special floors, acoustical wall treatment, class bells, clocks, fire gongs, gas and electric service for special equipment, exhaust outlet for motors in the auto shop, door locks, and other necessary items. In all of these the architect may not get your idea. Writing is more certain than the spoken word and will prevent many misunderstandings. The following general specifications, with comments, will illustrate this point as it applies to two items of importance.

Specifications for Locks

A. Doors on tool cribs, supply room, shops, laboratories and other rooms containing valuable equipment should be equipped with cylinder locks.

1. Locks on room doors should be different for each room, but master-keyed to permit the custodian and building principal access to each room without carrying a large number of keys.

2. Locks on tool cribs and supply room should be of a different series than room doors so that tools and supplies will not be accessible to the custodian who is very often big-hearted in making loans to other individuals who frequently request the use of tools. The locks within each room should be identical but should be different for each room so that teachers can be held responsible for the equipment.

3. Locks on toolroom and supply-room doors should be of the solid-bolt type to prevent picking, but classroom doors, as required by law, should be of a type than can always be opened from the inside even when the lock is closed.

B. All tool cabinets and project lockers should be provided with a good quality of cabinet lock.

1. All locks within each room should be identical for the convenience of the teacher.

2. All cabinet locks within each building should be different for each room, but master-keyed on a single series for the convenience of the building principal, or in case of emergency such as occurs when a teacher misplaces or loses a key.

Specifications for Electrical Control

A. Control for machinery.

1. Individual motor drive should be provided for each machine. This eliminates the necessity for countershafting and presents a much better appearance. It is also more efficient than having all machinery operated from a single motor. Where an extensive equipment is used continually, such as in a factory, it might be more economical to have the entire installation operated from a single large motor or engine. There may, however, be difference of opinion upon the relative advantages of each type of drive.

2. All motors in each room should be centrally controlled. In this manner all the machines can be stopped by throwing a single switch.

3. Each motor should be protected by an automatic thermol switch which will throw out in case of overloading or in case of a short in the wires. These switches can be located on each machine or combined in a central distributing panel along with the master throw-out switch. This system provides for a push-button control on each machine for starting and stopping. It is much simpler and safer than another type of switch, as the machine can be stopped instantly with either hand in case of accident to machine or operator.

4. An additional safety factor can be provided by placing two or three master push-button switches at various parts of the room so that the teacher or any student can stop all machines in case of an accident.

5. Key switches should be used in place of the regular tumbler or push-button switch in the corridors and toilets. This will prevent the student from playing with the lights.

The above is merely an example of the many little details that should be considered by the school officials when making recommendations to the architect on details that must be specified.

Supplementary Activities to Safeguard the School's Interests

A. Check the architect's drawings and specifications.

When all of the above items have been included, a detailed checking should be made of all plans and specifications to make sure that no errors or conflicts occur. The architect is only human and he may not have been able to interpret all the material that was presented to him. If this is done before the final tracing of the plans and letting of the bids, many errors or oversights may be discovered. Changes can be made very easily at this time, but will be hard to make after the plans have been interpreted into steel and masonry.

B. Drawings.

Prints of the preliminary layouts and copies of all recommendations made to the architect should be kept on file as a future check on anything that may later be found to be unsatisfactory. The writer has been saved from a very embarrassing situation by having evidence to prove that he was not responsible for omissions and errors that appeared during the construction of the building.

C. Inspection of the building during construction.

Although the architect is required and paid to inspect the construction of the building, the school official will find it profitable personally to inspect the building from an educational standpoint. Due to the complexity of a complete set of plans and specifications for a modern school building, some items may escape the scrutiny of the plumber, carpenter, or electrician, as well as the architect who is inspecting the job. A detailed written report of all errors and omissions should be sent to the superintendent of schools or to the architect where you have authority to deal directly.

Following are a list of errors that were discovered by the writer during the construction of a vocational building several years ago. The inspection and report resulted in a distinct saving to the school as well as to the builder.

1. The plans for wiring, heating, plumbing, and built-in fixtures were made independent of each other and had not been adequately checked before construction was begun. Two days before the time set for plastering it was discovered that in two rooms the service panels for house telephones, thermostats, and light switches were placed in the location provided for built-in cabinets. It took comparatively little work at this time to move them to the opposite side of the doorway, but would have caused considerable time and expense after the plastering had been done.

2. Gas and electric outlets had been shown on the general plan in conjunction with the equipment, but were omitted from the plumbing and wiring plans. Convenience outlets had been installed below the level of cabinet wall benches.

3. Ground for blackboards and display boards were overlooked in several rooms.

4. Cabinet locks were omitted and cupboard catches substituted in their place. This was corrected at no cost to the board of education.

NOTE: The above errors were all detected in time to prevent a loss to the school. These errors and many others have probably occurred a number of times in the history of school building and are worthy of careful consideration of every industrial-education teacher or director so as to safeguard the school's interests during a building program. Because of the comparative complexity of the industrial rooms and equipment, this problem is more vital than in planning regular academic classrooms.

Conclusion

In closing there are a few thoughts that are left to the reader which have been found to be of considerable significance.

1. Think through and plan each detail accurately before plans are put into effect. Errors are hard to correct in steel and masonry.

2. It is much easier to get cabinets, equipment, and other similar items when the building is being built than it is afterward. Include everything that is needed in your original planning.

3. Overestimating the requirements will result in unused equipment and rooms. This probably is as much if not more serious than underestimating your needs.

4. Every situation requires a slightly different treatment and no one set of plans will have universal application. The studying of the many excellent layouts that appear in the four issues of *Bruce's School Shop Annual* that have appeared to date, will enable the reader to make adaptations which will take care of his own particular needs. Superior school buildings can be planned only by borrowing the best ideas and omitting the faults contained in a large number of other school plans.

Much more could be said in connection with every problem that has been presented, but space does not permit a full explanation. A complete mastery of all the techniques referred to require years of experience, extensive study, good judgment, and originality. The writer expresses the hope, however, that enough has been said to instill in the reader a broader conception of planning a school building, to convey some of the techniques required for this planning, and stimulate a desire to produce better-planned buildings and a square deal for industrial arts and vocational education in the future.

Tests and the Classroom Teacher—II

*Harry B. Nash and Roy R. Van Duzee**

WHEN the tests have been given and the pupils' responses secured, the next problem is to interpret the results. The results are in terms of numbers or scores. How can these scores be manipulated so as to reveal their hidden meaning?

First, arrange the scores in order. This step is essential to any interpretation of the results of your test. This tabulation may be made as follows:

Find the lowest and highest scores of the class and then write these scores, and all scores in between, in column form from the lowest to the highest on the left-hand side of your paper. Label this column *scores*.

TABLE I

Scores	f	Score×f
20	I	20
19		0
18	II	36
17	II	34
16	III	48
15	𝍸	40
14	IIII	56
13	III	39
12	I	12
11	I	11
10	II	20
9		0
8	I	8
7	I	7
	27	381

POSSIBLE SCORE 23

Then head the next column *f*; *f* stands for frequency and means the number of pupils making a given score. Tabulate with a tally the scores falling at each point. When you reach a fifth tally of any score, make it by crossing the four already entered, as shown in Table I. You are now ready to do something with the scores of your class. You can see at a glance the highest and lowest scores; you can see the spread of the class scores. You will wish first to find a single number that will represent the achievement of the class as a whole. A common measure is the point around which the pupils' scores tend to cluster. This may be either the mean or the median. The mean is nothing more than the average score of the class. This is found by finding the sum of the scores (see Table I) and dividing by the number of the cases. In the illustration given in Table I, the sum of the scores is 381 and the number of cases is 27; thus, the average score is $\frac{381}{27} = 14.1$.

Another common measure of the central tendency of the group is the median. This is the mid-point of the distribution, i.e., the point below and above which there are half of the scores. It is more easily found than the average. Merely count up halfway from either extreme of the distribution. For example, in the illustration given since there are 27 scores, halfway between the score of the thirteenth and the fourteenth person which would have been 15, since both the thirteenth and fourteenth pupil made the same score. Had the thirteenth pupil made a score of 15 and the fourteenth pupil made a score of 16 the median would have been 15.5.

A measure of central tendency, while it gives a description of the class results, is not completely adequate. Two groups may have the same median or average, but still differ in variability. For example, in the illustration the range of scores from 7 to 20 could have been smaller or larger and the median or average remained the same. It is obvious, then, that some other measure than central tendency is needed to completely describe the results of your class. Some measure of variability is needed. This article is not intended as a treatment of educational statistics, hence, a discussion of the various measures of variability would be out of place. However, as the article is designed to give the classroom teacher a ready and practical way of interpreting the class results, we will give one measure of variability which is easily found, and if the method given above for finding the median is understood, it will be comparatively simple to find the measure of variability, since nothing really new is involved. The measure is known as the quartile deviation (Q). It tells the spread of the middle 50 per cent of the scores of your class and thus tells something of the homogeneity of your class results. It is found by determining the first quartile (Q_1) and the third quartile (Q_3). These are readily found when it is understood that the median is the second quartile (Q_2). As the median marks off the point below and above which 50 per cent of the scores fall, so the first quartile marks off the point below which the lowest fourth of the class lies and above which the highest three fourths lies, and the third quartile likewise separates the lower three fourths from the upper one fourth of the class. Using our illustration, we will proceed to find Q_1 and Q_3. A fourth of 27 is 6.75; hence, the first quartile (Q_1) is the score of the 6.75 person or three fourths of the way between the score of the sixth and seventh person. Since the sixth person scored 12 and the seventh person scored 13, the first quartile is 12.75. In a similar manner we find the third quartile. Three quarters of 27 is 20.25; hence, the third quartile (Q_3) is one fourth of the way between the score of the 20th and 21st person. In our illustration this is 16 since both the twentieth and twenty-first pupils score 16. Having found Q_1 and Q_3, we subtract Q_1 from Q_3 and divide by 2; this gives the quartile deviation figured accurately enough for practical classroom purposes.

$$Q = \frac{Q_3 - Q_1}{2} = \frac{16 - 12.75}{2} = \frac{3.25}{2} = 1.67$$

*Mr. Nash is Director of Research, and Mr. Van Duzee is Supervisor of Industrial Arts, of the West Allis Public Schools, West Allis, Wis.

What does this number mean? It means that if you add and subtract 1.67 from the median score, you have approximately the range of the middle 50 per cent of the class scores. The size of this number tells you the story as to the variability of the group. Since in this instance 50 per cent of the class vary by less than two points, the class is relatively homogeneous. However, the number must be considered in relation to the possible score — 23. To take account of this relative value of the quartile deviation, Pearson suggests dividing it by the median score and multiplying by 100. For example, in our illustration:

$$\frac{100\ Q}{Md.} = \frac{100 \times 1.67}{15} = \frac{167}{15} = 11.07$$

This procedure is really necessary only where you are comparing the variability of two groups having tests with different possible scores.

The above interpretations are in terms of class results. How about the scores of the individuals? It is very desirable to have a comparable unit whereby the scores of pupils on different tests with different possible scores may be compared.

Two ways are here given. There are many others. These two seem to the writers to be the simplest to interpret and the easiest to find, and thus they are of most value to the classroom teacher.

First. The Percentile Score. To find this requires the knowledge of no new procedure. It is merely the further application of the procedure used in finding the median. The median score is the percentile score of 50, since 50 per cent are approximately below and above this point. The Q_1 score is a percentile score of 25, since this is the score below which 25 per cent of the group fall and above which 75 per cent of the group fall; and the Q_3 score is 75, since this is the score below which 75 per cent of the group fall and above which 25 per cent of the group fall. The other scores are determined on the same basis and bear the same interpretation. Table II gives the distribution used in Table I and shows the scores (also called raw scores) turned into percentile scores.

To find the quantities in the subtotal column, begin at the lowest score and opposite each score place the total number of all those who have scored, up to and including that score. Thus, opposite score 10, the subtotal is 4 because 1 scored 7, another scored 8, and 2 scored 10, hence a total of 4 have made a score of 10 or less.

TABLE II

Score	f	Subtotal	Rank	Percentile Score Approx.	Percentile Score More Acc.	School Mark
20	I	27	27	100	98	96
19		–	–	–	–	–
18	II	26	25.5	96	93	90
17	II	24	23.5	89	86	86
16	III	22	21	82	76	83
15	⧻ I	19	16.5	70	60	80
14	IIII	13	11.5	48	41	78
13	III	9	8	33	30	76
12	I	6	6	22	20	74
11	I	5	5	19	17	72
10	II	4	3.5	15	11	70
9		–	–	–	–	–
8	I	2	2	7	6	60
7	I	1	1	4	2	52

POSSIBLE SCORE 23

The approximate percentile score may be found by finding the per cent each subtotal is of the total, and the score falling at this per cent will have that percentile score. For example: The subtotal 4 is 15 per cent of 27, therefore the score 10 has a percentile rank of 15. This is doubtless accurate enough for classroom purposes. The attempt in this article is to reduce the statistics involved to the absolute minimum and yet make them of service to the classroom teacher in the interpretation and use of class-test results.

If a more accurate percentile score is desired, it may be readily found by a simple formula given by Gregory and Renfrow[1]:

$\frac{2R-1}{2N}$; where R = rank of pupil and N = number of cases.

The rank of each pupil is his relative standing with reference to the other pupils who have taken the test. Thus, the pupil with the lowest score has rank 1, the next higher, 2, and so on. If more than one pupil makes the same score, find the average rank. For example: 2 pupils score 10 — their rank is 3 and 4, hence the average of 3 and 4 is 3½ for both. Applying the formula to the score, we have

$$\frac{(2 \times 3\frac{1}{2}) - 1}{2 \times 27} = \frac{7 - 1}{54} = \frac{6}{54} = .11 = 11\%,$$

whereas the other method gives 15. The more accurate percentiles have been figured and inserted in the column so labeled in Table II. The only real differences exist where a large number of pupils score at the same place. This is to be expected. However, if the test distributions which are to be compared are all figured on a similar basis, the comparative value is about the same for both methods. If you interpret the percentile score as is usually done — namely, the score which gives the per cent of pupils any given pupil exceeds in score — the latter method is preferable. Using the former method, the percentile score is more correctly defined as the per cent of pupils he equals or exceeds in score. For example: Using the percentile rank of 11 obtained by the latter method means that the pupil at this point exceeds 11 per cent while the 15 obtained by the former method means that he equals or exceeds 15 per cent. In either interpretation the score has a very definite meaning.

Second. The second comparable score suggested is the school mark. Such a comparable score has the additional value of possessing at once a definite meaning for both teacher and pupil, since this is the unit of measurement used in all school records. The device here given is flexible to local situations and to the small numbers of pupils found in the average class, and requires no technical knowledge of statistical procedure to use successfully. It has received a very

[1] *Statistical Method in Education and Psychology*, Gregory-Renfrow. C. A. Gregory Company, p. 99.

extensive tryout in our own local system, and is now used by all teachers in our schools for all subjects and in all grades. It has met with unusual success and has proved its distinct superiority to the procedure used by many schools, viz., assigning marks in strict conformity to the normal curve. While, of course, the normal curve forms the basis of the scheme suggested, the plan permits, as previously indicated, adaptation to small groups. The normal-curve procedure works considerable injustice to selected groups such as may be found in the average class.

1. First make a distribution of the scores made by your pupils. In Table III the scores of a class are given as an illustration.

TABLE III

Score	Pupils	School Mark
20	1	96
19	–	93
18	2	90
17	2	87
16	3	84
15	6	81
14	4	78
13	3	76
12	1	74
11	1	72
10	2	70
9	–	66
8	1	62
7	1	58

POSSIBLE SCORE 23

2. Three points are to be determined somewhat on an arbitrary basis, guided, however, by the nature of the distribution. These three points are the "failing point," the school mark assigned to the highest score, and the school mark to be assigned to the median score.

a) First, consider the *failing point*. The following will guide in determining this point; ordinarily, from 5 to 20 per cent will fail. Occasionally there will be no failures in the class. This can happen with a very selected class. However, such *selection* will usually show up in the test scores. For example: Suppose the distribution of the class given had stopped at 14 instead of 7 with the scores ranging as follows:

TABLE IV

Scores	Pupils
20	1
19	2
18	3
17	4
16	6
15	7
14	4

Such a distribution would indicate selectivity and there would be no failures. By a "selected group," we mean selected both as to ability and performance.

Again it may happen that the group is selected at the other end — poor in both ability and performance. This will also show up in the distribution of scores. The scores will distribute themselves at the lower end — just the reverse of the foregoing case. The percentage of failure may then be higher than 20 per cent. To return, now, to a more average situation as given in the illustration. There is a natural break in the scores at 8–10. Setting the failing point at 10 would take care of this distinct division in ability and fail about 7 per cent, which is a little below the normal amount of failure on a test. The smallness of failures is probably due to inadequate measuring by a test with so few items. A knowledge of your group may raise the failing point. No knowledge of the group in the face of the given distribution could make this point lower and fail less than 7 per cent. Some teachers say that all pupils not getting 50 per cent of the material should fail. This may sometimes serve as a guide but should by no means be a deciding factor. The nature of your distribution is the controlling fact — not per cent of material. The former alone takes care of the difficulty of different tests.

b) Next, there is the question of the school mark to be given the highest score. The nature of the distribution is the guide. Suppose in our illustration the highest score were 17 (possible score being as stated, 23), and the scores distributed themselves down from this point. The top score, then, would not be 96 but say about 90.

c) Next, find the median of the group. Normally the median score will receive a school mark of 78. This is one given in the illustration. However, there are instances where 78 is not the best mark. The median score may range from 76 to 82, depending again on the nature of your group, as indicated by the distribution of the scores and your knowledge of the class. In a highly selected group, the median score may get a school mark of 82 or 76, depending on whether selection takes place at the upper or lower end.

3. The school marks determined for these three points in this given illustration are placed accordingly. The 78 used for the median school mark is based on the failure point being 70. If your failing mark is different, your median score will be different. Adjust this to meet your local marking system.

4. Fill in the intermediate school grades by determining within each interval the relationship between the test-score points and the school-mark points. For example, between the median score and the highest score, there are 6 points and between the school marks at these points are 18 points; therefore, 1 point in score equals 3 points in school mark; also between the median and the failing point, there are 4 points in score, while between the school marks at these points are 8 points; hence, 1 point in score equals 2 points in school mark.

5. The school marks below the failing point depend upon the number of points in the test. In the illustration given, the same procedure may be followed as previously indicated. Between the score 9 (highest failing score) and 0 there are 9 points, and between 69 (highest failing school mark) and 30 there are 39 points, thus making an approximately 4-to-1 ratio. School marks rarely fall below 40 and never below 30. Depending upon the nature of the distribution, 40 or 30 will be taken as the lowest school mark.

The fact that educational measurement is rank measurement, not measurement in a physical sense, must

be accepted at the present time. The objective test furnishes the most reliable known device for ranking pupils. It is far superior to the subjective devices of the past. As Ruch states aptly, "If an examination, a series of examinations, or the composite evidence upon which marks are determined, rank the pupils in the approximately correct order of achievement, it matters little what form the final statement of marks may take. No marking system can be more valid than is the underlying ranking of the pupils."[2]

The scheme is much more objective than may appear to the teacher who first uses it. In a class on *Measurements*, one of the authors recently gave a class distribution of scores to a group of teachers unfamiliar with the scheme, and after one class explanation, the variation of school marks handed in by these teachers was negligible.

It is suggested that teachers keep their distribution of scores for their various classes from year to year, and thus build up a cumulative distribution on which local standards may eventually be set.

Summary

Testing before beginning a course will show the special abilities and the information and skill possessed by the students enrolled in the course. This information forms the basis for the proper starting of the course. Testing during the course improves teaching because the facts relative to the results of teaching become apparent, and methods of teaching can be used to reteach what is necessary. Tests used at the end of the course reveal information upon which to base promotion, assign grades, and compare the amount and quality of work done with the work done by previous classes. The use of the standard test will permit comparison with other schools doing comparable work.

In order to make the best use of the tests, it is necessary adequately to interpret the results. This should be for both the class as a whole and for the individual pupils in the class. For this reason, the various statistical devices have been presented.

It should have appeared from this discussion that good measures of shopwork may be constructed by the classroom teacher if the proper known techniques are followed and reasonable care is exercised in their use. The results may be interpreted from all desirable angles by any classroom teacher having but a minimum knowledge of mathematics.

It should be noted, in conclusion, that the use of tests does not of itself improve your instruction or solve your teaching problems. The tests, adequately interpreted, definitely present to the classroom teacher this teaching problem. It gives a diagnosis of the situation. The remedy still needs to be applied.

[2] *The Objective or New-Type Examination*, Ruch. Scott, Foresman & Co., pp. 376–377.

Determining Teacher-Training Needs

*H. W. Paine**

IN considering the needs of trade and industrial-vocational teachers in any community, every observing teacher trainer will recognize four outstanding fields for investigation and improvement:

1. The instructor's skill as a tradesman.
2. The instructor's technical knowledge relative to his trade.
3. The instructor's teaching technique and skill.
4. A general field, concerning such matters as the following: The instructor's relationships and responsibilities to his fellow workers, superintendent, state supervisor, community, and the professional organizations in his field; his knowledge about other matters of detail such as needed information concerning material, supplies, displays, and information regarding procedures of other instructors in his territory; his need, perhaps, for a clearer conception of the real objectives of vocational education; and, last of all, the need for encouragement, stimulation, and advice when local situations develop that threaten to damage the effectiveness of the vocational program in his community.

*Vocational Teacher Trainer, University of the City of Toledo.

Needs for Improving Tradesman Skill

There is little that the vocational teacher trainer can do toward determining and meeting the needs set up under the first caption; namely, the instructor's skill as a tradesman. The state certification requirements will practically without exception insure the employment of a highly skilled mechanic for the shop positions if not for the related-subjects classes. In few cases will the teacher trainer's judgment concerning the vocational shop teacher's trade skill be other than a more or less accurate estimate of this skill, for it is unreasonable to suppose that the teacher trainer's background will have made him thoroughly familiar with the manipulative processes of more than two or three fields at the most. Nevertheless, the teacher trainer should, by means of observation and a card-index record system which will be described later, inform himself as fully as possible concerning each instructor's skill and trade background, for in no other field of education is Mann's statement of 100 years ago as true as in trade training: "No unskilled hand should play upon a harp where the sounds remain forever in the strings." Observation of shop teachers' needs, as far as mastery of trade is

concerned, show that many of them could profit greatly from an occasional summer spent in the trade, bringing their trade practices up to date and developing skills in branches of the field with which they are not familiar.

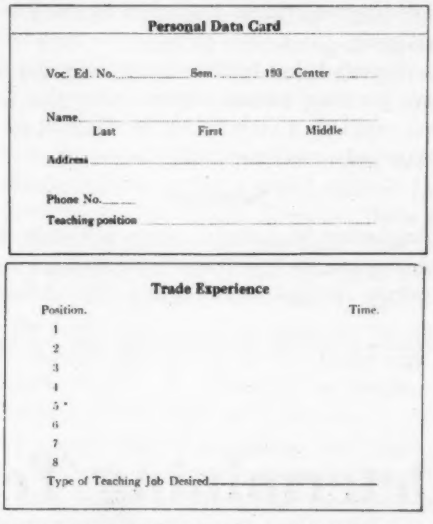
Vocational Teacher's Technical Knowledge

As a means of roughly determining the extent and "up to dateness" of a vocational teacher's technical knowledge and his needs in this field, the teacher trainer may ask questions from time to time regarding some new development in the instructor's field. For instance, in auto mechanics, an inquiry regarding free wheeling; in machine-shop practice, a question regarding a new cutting-tool alloy, such as tungsten carbide; in drafting, an inquiry regarding the use of Ozalid paper or the new thumb-tackless drafting board, will suffice not only to disclose the teacher's familiarity with new developments in his field, but these questions also will be of value to both the teacher trainer and the instructor in different ways. They will broaden the former, for if the teacher trainer asks a question, he must be at least vaguely familiar with the answer. The questions also will stimulate the vocational teacher and encourage him to keep abreast of modern developments. Questions of this kind are valuable for still another reason, and that is because they establish a common meeting ground for teacher and teacher trainer.

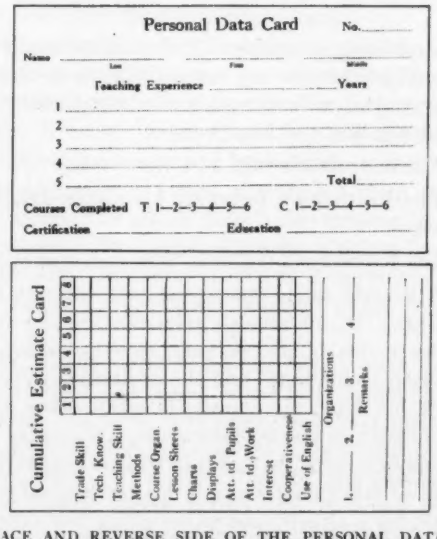
Personal-Data Record System

The saying that "if anything is worth finding out, it is worth recording" is particularly true regarding the needs and characteristics of the vocational teacher. The personal-data cards described in this article may be of interest. Further experimentation with the system may develop changes, such as combining the two cards into one in some cases, altering the items to be rated, or adding or eliminating different items. On one side of the card shown in Figure 1 will be found items of general interest orienting the instructor as to class, address, and teaching position. The reverse side of this card is used for listing briefly the trade experience of the teacher, and if he is a member of a preëmployment group, the type of teaching job desired.

The card shown in Figure 2 provides space for teaching experience and required state courses that have been completed. The information on the reverse side of this card is for the personal use of the teacher trainer only and is not an official transcript of the instructor's work in any sense of the word. The record of courses completed on the front of this card is divided into a T and a C group, depending upon whether the work recorded is in the trade and related set-up or in the continuation group. Spaces are also left for certification and educational status of the individual involved. Remembering that the value of records depends upon their accuracy and objectivity, the reverse side of this card might be open to criticism on the grounds that the ratings obtained may be more or less subjective. However, if this record does nothing more than cause the teacher trainer to think constructively and individually about each instructor on the points suggested, the card will have served its purpose. This rating card is cumulative, providing spaces for eight different ratings so that the teacher trainer may revise his estimate of each teacher from year to year by registering improvement on each of the items in the rating scale. This device, if properly used, shows that no condition need necessarily be static, and that the teacher trainer's formal and informal work should eventually show its effectiveness by bringing desirable changes on this cumulative card. Spaces are provided at the bottom of the card for noting the instructor's affiliations with educational and other organizations. A few lines are also provided for remarks by the teacher trainer.



FACE AND REVERSE SIDE OF THE PERSONAL DATA CARD
ORIGINAL PRINTED ON A 5 BY 3 IN. CARD



FACE AND REVERSE SIDE OF THE PERSONAL DATA RECORD CARD.
ORIGINAL PRINTED ON A 5 BY 3 IN. CARD

Teaching Technique and General Needs

Determining and serving the needs grouped under items 3 and 4, that is, under (*a*) General Teaching

Technique, and (*b*) Miscellaneous Field, will undoubtedly occupy by far the greater part of the teacher trainer's time.

Success in teaching depends upon many things, such as natural capacity, interest, effort, training, physical conditions of equipment, housing and class personnel, and many of these items are beyond the control of the teacher trainer. Certain formal courses are required of vocational teachers in practically every state set-up and these courses may carry state or college credit or both, according to the policies of the state concerned. Viewing the matter in one light, then, the training needs of the vocational teachers in a community can be easily ascertained by a visit of the teacher trainer to the state department where the records of the local group may be looked over in order to find how many of the required courses are uncompleted by the different individuals. These so-called formal courses, if properly organized and used, do much to upgrade both the teaching and the morale of the vocational teacher personnel in a community. If improperly administered, however, they may be quite detrimental. Too often the instructors attend these classes with a cynical, rebellious, "certification meeting" feeling, assuming the same attitude to which they so strenuously object when it is exhibited by their own compulsory-attendance pupils. This attitude may be the fault of the teacher trainer, or of the local coördinators, or it may be due to the personality of the individual teacher, or of any combination of these agencies. Perhaps the courses are not conducted with sufficiently high standards of accomplishment to challenge the best efforts of the teachers. Or they may be conducted on such a lecture-course, assigned-reading, term-paper survey basis as to be not only disgusting to anyone not pursuing a doctor's degree course, but actually detrimental to a teacher's efficient teaching. A vocational instructor handling oversized classes from 8:30 a.m. to 4 p.m. with evening-school teaching work in addition, should not be troubled with work that is not thoroughly worth while. If he is, it will almost surely affect his morale and his teaching. But the standards should not be too low either. Probably the suggestion made in Federal Bulletin No. 117 that these classes be conducted on the conference-discussion basis, is a good method to follow.

Perhaps it is well for the teacher trainer to depart from the traditional lecture method and use more mimeographed material, summarizing important articles and books for his classes, seeing that the assigned work is of practical value instead of a useless burden to them. Instead of expecting from vocational teachers work which would be required for a master's or a doctor's degree elsewhere, the teacher trainer should cull from his wealth of material only that which will be of specific interest and value to his group of vocational teachers. Rather than require employed vocational teachers to read and report upon book after book, it is much more logical and profitable for the teacher trainer to summarize the most important and outstanding facts in these books and place the material thus obtained in the hands of the teachers. Protracted research work on the part of the vocational teacher, unless it fills some specific need, is simply an added burden on a ship already loaded to the water's edge.

Need for Service Beyond Formal Teacher-Training Classes

An observing teacher trainer, conducting formal teacher-training classes and then visiting his instructors at work, will soon come to the realization that these men have needs for service far beyond the scope of these formal classes regardless of how efficiently conducted they are. These instructors may need immediate advice regarding courses of study, even though this may be most *inconsiderate* of them considering the fact that the organization of an instruction-material course will be given in their territory semester after next. Perhaps they need assistance with record systems, or would like to know where sample lesson sheets may be obtained. Why not meet these immediate needs if it is possible to do so?

In regard to the related-subjects teachers in his territory, every teacher trainer should recognize the need to impress them with a philosophy of vocational education that will prevent them from taking the path of least resistance in their instructional procedure. Situations are often met where a large class in related mathematics will contain perhaps auto mechanics, machinists, patternmakers, electricians, and plumbers. Under such conditions, some instructors will throw up their hands in despair and feel perfectly justified in teaching *general mathematics,* allowing the different members of the class to make their own applications. The mathematics, of course, immediately loses its value because of this lack of application. The only road open to the instructor is developing individual material for each group represented in his class — individual teaching, in other words. Unless the teacher trainer meets such situations with the proper advice at the right time, the instructor will have launched himself upon a course of general education instead of Smith-Hughes trade training.

The following shows the various needs that have been suggested from time to time by instructors taking teacher-training work. This list includes both the formal classes and the other activities that go with class visits and personal contacts. Because many of the activities listed are supervisory in character, it is absolutely necessary, in order properly to carry on any such activities, that the teacher trainer work in harmony with the local authorities. Obviously much of the success of the work depends upon the good judgment, tact, and common sense of the teacher trainer.

Questionnaire Concerning Teacher Needs

In order to get impartial and unbiased answers to the questionnaire shown herewith, it was specified that the vocational teacher answering it need not sign his name. This resulted in securing some very plain and candid replies. This method is highly recommended to any teacher trainer who is not oversensitive and who is not devoid of a sense of humor.

QUESTIONNAIRE

In your opinion what type of vocational teacher-training activities will be of greatest benefit to employed vocational teachers. Check relative importance with A, important; B, valuable; C, slight value; D, worthless. Keep your own case in mind if a vocational teacher.

	Evaluations					
	A	B	C	D	*Unanswered*	*Average*
1. Assisting teacher in developing courses of study	39	11	2	1	0	A—
2. Formal teacher-training classes for college or state credit or both	31	11	6	2	3	A—
3. Rendering any other service that will help the vocational teacher	31	12	1	0	7	A—
4. Advising teachers regarding proper teaching methods	29	17	7	0	0	B+
5. Calling conferences of groups of teachers to discuss and solve problems relating to their work	28	19	2	4	0	B+
6. Assisting teachers in developing lesson sheets	31	16	4	1	1	B+
7. Demonstration teaching on part of teacher trainer	26	17	7	2	1	B+
8. Submitting sample courses of study, lesson sheets, and teaching material for inspection of teachers	22	25	5	1	0	B+
9. Class visitation of teacher at work	18	25	6	3	1	B+
10. Assisting teacher with pupil record and progress charts	12	20	15	4	2	B—
11. Assisting teacher to locate display material	10	24	15	4	0	B—
12. Accompanying coördinators or instructors on trips to industry	11	17	20	4	1	B—
13. Assigning books for teachers to read	10	12	23	6	2	B—
14. Advising teacher regarding equipment problem	6	17	25	5	0	C+
15. Assisting teachers with material records and cost systems	3	15	25	7	3	C+
16. Requiring reports on book contents	4	13	25	10	1	C+
17. Advising teacher regarding tool-check systems	3	12	23	9	6	C—
Some Additional Points Suggested as Follows:						
18. Assisting teachers in credit evaluation	3					
19. Locating sources of material for course	2					
20. Selling vocational education to superintendents and school boards	1					
21. Helping to standardize grades	1					

FIG. 3. THE QUESTIONNAIRE

This questionnaire was circulated among 53 vocational teachers and coördinators in Ohio with the following results:

The number of individuals giving the different ratings is indicated in the space following the items in Figure 3. In case no answer was given, that also is noted. An average value for the ratings for each factor is entered in the average column. This central measure was secured by the number-substitution method. The items in this list have been arranged according to the values of the central measures obtained as described. The introductory instructions accompanying the questionnaire are copied verbatim at the head of the tabulation.

At the end of the foregoing questionnaire judgments were asked regarding the relative value of formal and informal classes with the following results. Out of a

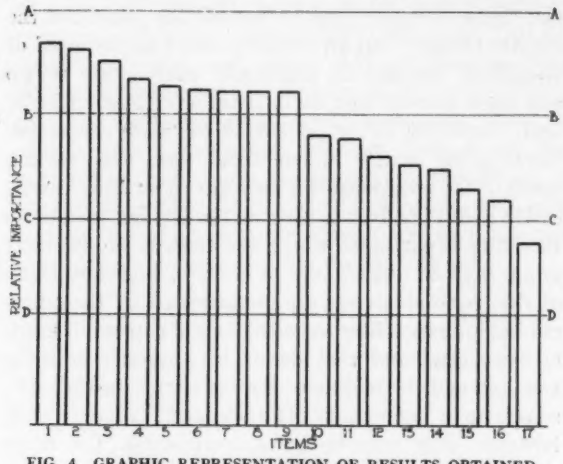


FIG. 4. GRAPHIC REPRESENTATION OF RESULTS OBTAINED FROM QUESTIONNAIRE SHOWN IN FIG. 3

total of 53 reporting, 22 placed formal classes *first*, 26 placed informal work *first*, and 5 expressed no choice. Reasons given for the choice were varied, some of the more significant and typical ones follow:

1. Formal classes are of small value except for contacts with other vocational instructors.

2. Formal classes are more valuable because of contacts formed and new visions obtained.

3. Formal work is more valuable because, since it is necessary for teachers to have certificates and degrees in order to teach, the majority will take the formal courses for the satisfying of these requirements and for no other reason.

4. For my case the formal classes are the more desirable as I do not have a degree.

5. Better help can be given by the informal type, for by being on the job the teacher trainer can make suggestions and point out mistakes that would help the instructor at work.

6. Informal talks regarding problems always end in a decision, and the informal calls of the teacher trainer are always looked forward to because then the problem arising from week to week may be discussed.

7. Formal work is more valuable because it brings teachers together for solving common problems.

8. Informal work is more valuable because specific problems which trouble the teacher can be detected and solved rather than offering a panacea for all ills.

9. Informal work is more valuable provided the teacher trainer has done the same kind of teaching. Usually the teacher trainer expounds a lot of theory that is of no value when it is applied.

10. Formal classes are more valuable because they offer an opportunity for open discussion between all teachers.

11. Formal work is more valuable because we are

interested first, in certification; second, in sources of material; and third, in the exchange of ideas.

12. More individual help can be given by informal work because individual needs become better known.

Preparation Time for Formal Teacher-Training Classes

The time consumed in preparation for formal classes per week was reported as follows: Number reporting, 48; range, 1 to 10 hrs.; average time, 2.7 hrs.

No distinction was made as to whether the work was taken for state, college undergraduate, or college graduate credit, as the interest was solely in the effect the work would have on the teachers.

A frank question was then asked as follows: Do you find these hours of preparation for formal teacher-training classes to be taking time that would be better employed in preparing lesson material for your regular teaching work? To this question, 50 answers were obtained, 13 answering yes and 37 answering no.

The next question asked was, How many hours per week on the average do you feel you could *rightfully* spare for preparation for formal teacher-training classes? The range of answers to this question was from 0 to 13 hrs. with an average of 3.1. Nine answered, "As much time as is necessary."

These results indicate that although a fairly large percentage find the formal classes to be burdensome, the average time of 3.1 hours that the instructor was willing to devote to this work each week, does not vary greatly from the time now being expended on this preparation, namely 2.7 hrs. per week. The fairly even division, 22 to 26, between instructors favoring the formal and informal types of work is interesting. This undoubtedly indicates that each type of work has its value and its place in the scheme of things.

Suggestions were called for as to how the teacher-training work, both formal and informal, might be improved and made more profitable. Some of the rather frank statements follow:

1. Select courses that meet an immediate need of the teachers.
2. Use conference method and require no outside work except perhaps one special report during the course.
3. Give related teachers shop practice, and shop teachers, teacher-training work.
4. Wider range of subjects.
5. Have a class of auto-mechanics instructors only.
6. More definite assignments, less class discussion, more individual help in class.
7. Secure services of men of industry to discuss problems relating to our work.
8. Classes are very interesting and beneficial with little room for improvement — considering the subject matter.
9. Use part of period for open discussion of teaching problems.
10. Suggestions to teachers could be a little more point-blank.
11. Teachers should be grouped in classes according to the trade in which they are teaching.
12. Smaller groups, group according to trade.
13. Get down to brass tacks and consider practical instead of theoretical problems. Stop requiring readings of rusty books and answering scores of questions which mean nothing in a practical way even if one could answer them.
14. Use conference plan of teaching.
15. Eliminate most of work done now in formal classes and confine it to individual contact between teacher trainer and instructor.
16. Teacher trainer should devote more time to job-sheet analysis and lesson assignments of instructors.
17. Less formality in class. Carry classes on by conference plan. Let each group decide course to be taken.

Fourteen volunteered the information that they were pleased and satisfied with present formal teacher-training classes.

Suggested Improvements in Informal Work

1. Have a full-time teacher trainer for each large school spending all his time in informal work, forcing the issue with the instructor if necessary.
2. Assistance in exchanging projects with different centers in the territory. More time for research applicable to our vocational work.
3. Arrange visits of factory men to school shops.
4. More case studies from practical working basis. More work on smoothing out the instructors' troubles and less theory.
5. Closer check-up on teachers. More guiding for ineffective teacher.
6. Standardize all lesson sheets for same trade.
7. Keep us in touch with new material.
8. More time for individual conference with instructor.
9. More time for informal work.
10. Suggestions of teacher trainer should be given more consideration by local authorities.
11. Teacher trainer should have direct contact with superintendent of schools.
12. More individual help to each teacher.

Thirteen indicated they were pleased or satisfied with the informal work being done.

The foregoing suggestions are representative of those received and indicate that there is room for improvement in the teacher-training program, both in its formal and its informal phases. The larger share of the complaints concern the theoretical type of the formal work being done. There is, for instance, the suggestion to "get down to brass tacks." This criticism is probably justified, and only by inviting and studying suggestions of this kind from the vocational teachers on the job, can the teaching program be improved.

Survey of Informal Teacher-Training Activities Within and Outside of Ohio

The first portion of this survey dealing with the informal needs also was circulated among 14 state direc-

tors of vocational education and teacher trainers to determine how many of the needs listed were being met in various sections of the country with the following results:

	Yes	*No*
1. Class visitation of teacher at work	14	
2. Assisting teacher with pupil record and progress charts	14	
3. Advising teacher regarding equipment problem	14	
4. Assisting teacher in developing courses of study	14	
5. Assisting teacher in developing lesson sheets	14	
6. Advising teacher regarding tool-check systems	13	1
7. Submitting sample courses of study, lesson sheets, and teaching material for inspection of teachers	12	
8. Advising teachers regarding proper teaching methods	12	
9. Calling conferences of groups of teachers to discuss and solve problems relating to their work	12	
10. Assisting teachers with material records and cost systems	10	2
11. Accompanying coördinators or instructors on visits to industry	10	2
12. Assisting teacher in locating display material	9	2
13. Demonstration teaching on part of teacher trainer	8	1
14. Assigning books for teacher to read	1	
15. Requiring reports on book contents	1	
16. Rendering any service that will help the vocational teacher	1	

NOTE: *The foregoing data are graphically shown in Figure 5.*

The results of this survey, as well as the one preceding it, are necessarily very subjective in character since the matter of opinion plays a large part. Undoubtedly better methods of attacking the problem of determining the results and effects of teacher training in a community could be devised, but the results obtained are nevertheless significant and valuable in that they show attitudes and contain suggestions that are, without doubt, of value to any teacher trainer who "reads as well as runs." A wise and conscientious teacher trainer will check with his vocational teachers from time to time to determine their general needs and attitudes so that his future plans and policies may be more wisely formulated.

In conclusion, the needs of employed vocational teachers can only be ascertained by a teacher trainer through extended contact with each teacher. He must at least gain the confidence of each individual instructor and his friendship if possible. He must, of course, attempt to meet these needs as he discovers them and must hold himself ready to coöperate with the instructors in every way in order to make their program more effective, otherwise his work of discovering further needs will be greatly hindered. If the instructor "asks for bread and you give him a stone" in the way of poor advice, outrageous assignments, or no help at all, the teacher trainer will soon find that the instructor will have lost confidence in him and will have closed up like the proverbial clam.

Last of all, determining the needs of the instructor in a community is a cumulative process and will never be entirely completed. It challenges the ability of any teacher trainer to adequately ascertain, catalog, and meet these needs. If a teacher trainer will honestly attempt these tasks he will be doing the vocational

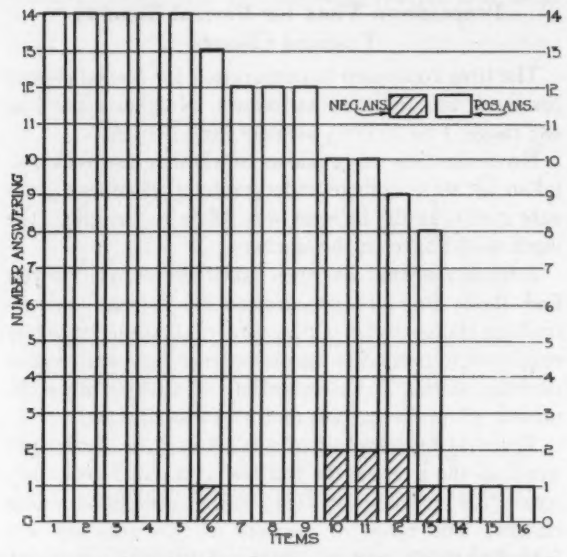
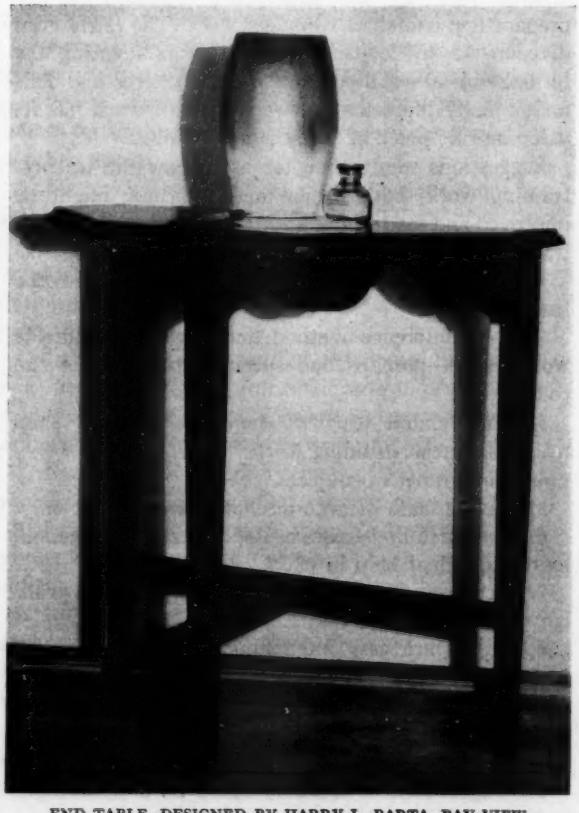


FIG. 5. GRAPHIC REPRESENTATION OF RESULTS OBTAINED ON SURVEY OF INFORMAL TEACHER-TRAINING ACTIVITIES WITHIN AND OUTSIDE OF OHIO

teachers in his territory an invaluable service in helping them to realize the tremendous possibilities of true vocational education.



END TABLE, DESIGNED BY HARRY L. BARTA, BAY VIEW HIGH SCHOOL, MILWAUKEE, WISCONSIN

How to Teach Layout Work to Printing Students

*R. Randolph Karch**

A LAYOUT is the working plan for a piece of printed matter. The layout is like the architect's blue print, and upon it detailed instruction should be given to the compositor — the size of the job, kind of border to be used, size and style of type, caps and lower case, widths of lines, and so on.

The layout should find its first place in the trade school. It is of greatest importance that the compositor be familiar with layout procedure, and to be able to accurately follow directions as given in the layout. Ambitious "comps" look forward to the day when they shall be the "typotect" of some large printing establishment.

The business and professional man usually has some connection sooner or later with the specifying and ordering of printed matter. As it is a rather difficult task to give accurate verbal specifications in regard to printing jobs, the layout, even if in rough form, bridges the gap of misunderstanding between the buyer and the printer. Therefore, in *training a body of intelligent buyers of artistic print,* it is well to give prevocational printing pupils this training, thus providing the boy with an opportunity to develop his creative ability.

In order to facilitate the process of laying out, a special sheet ruled to pica squares may very easily be printed in the school shop. The best size for the layout sheet is 8½ by 11 in., as most of the school jobs are either this size or smaller. Of course, plain paper may be used, but it is quite apparent that much more time would be required to measure with a rule, rather than count the pica squares on the layout sheet.

As can readily be seen, it is absolutely necessary to draw the lines of type on the layout to the exact dimensions. An accurate word count must be made, as a poor layout wherein the type does not fit is no layout at all. Any type founder's catalog is a useful guide, but a *type sheet* is much better.

When students are making the layouts, and when familiarity with the type sizes is lacking, lines very often fail to fit in the designated space. This results in the resetting of several lines in the job, which is a waste of time and effort. This evil can be corrected easily if the type sheet is referred to conscientiously.

The type sheet should contain a line of caps, lower case, figures, points, and one or more lines of text matter of every size and style of type in the shop. Over all should be printed perpendicular lines 1 pica apart to assist in figuring the number of letters of each size contained in every line.[1]

*Supervisor of Printing, Public Schools, Steubenville, Ohio.

[1]See the INDUSTRIAL-ARTS MAGAZINE, June, 1929, pages 229 to 231.

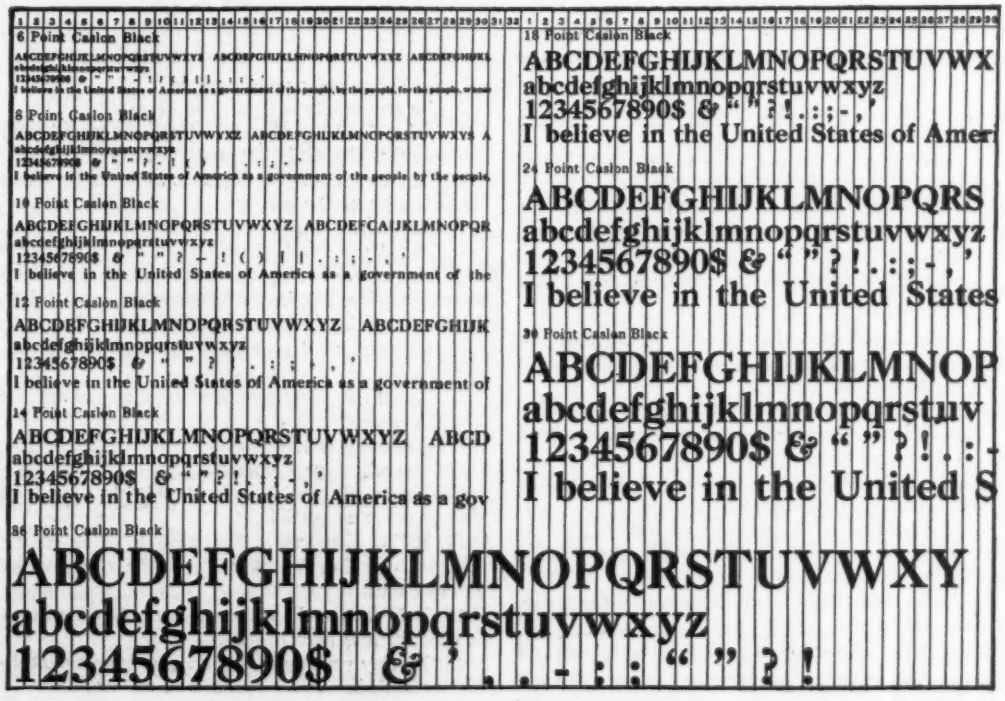

6 Point Caslon Black
8 Point Caslon Black
10 Point Caslon Black
12 Point Caslon Black
14 Point Caslon Black
36 Point Caslon Black
18 Point Caslon Black
ABCDEFGHIJKLMNOPQRSTUVWX
abcdefghijklmnopqrstuvwxyz
1234567890$ & " " ? ! . : ; - ,
I believe in the United States of Amer
24 Point Caslon Black
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FIG. 1. A TYPE SHEET, REDUCED IN SIZE, FOR COPY FITTING. THE SMALL FIGURES IN THE SQUARES AT THE TOP INDICATE THE MEASURE IN PICA EMS

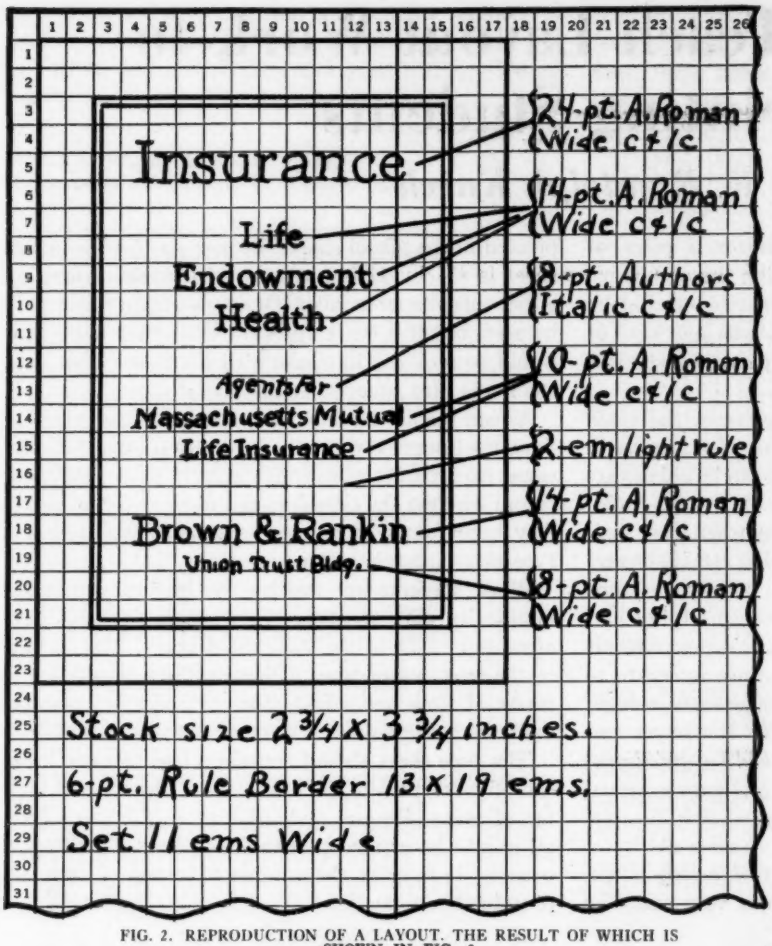


FIG. 2. REPRODUCTION OF A LAYOUT. THE RESULT OF WHICH IS SHOWN IN FIG. 3

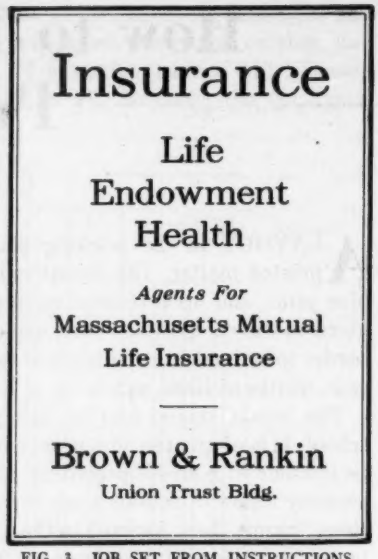


FIG. 3. JOB SET FROM INSTRUCTIONS GIVEN ON REPRODUCED LAYOUT IN FIG. 2

Best Widths for Body Type

8 point	14 picas
10 point	15 picas
12 point	18 picas
14 point	20 picas
18 point	24 picas

Body matter may be blocked out with straight lines, indicating on both the layout sheet and copy with letters A, B, C, and so on. Then this matter will be left in the copy, thus eliminating the tedious task of writing it in longhand on the layout sheet.

An illustration of the type sheet is shown in Figure 1.

The advantages of the layout may be enumerated as follows:

1. The layout gives a good idea of how the job will look when set in type.
2. It saves guesswork on the part of the compositor, eliminating trial-and-error methods in setting type.
3. Errors, and inappropriate and inharmonious elements may be easily observed and corrected before the job is set up, thus saving time.

In laying out printing jobs, the following procedure will be found helpful:

1. Draw on the layout sheet the size of the paper stock on which the job is to be printed. Use a pica rule, and draw the lines neatly, accurately, and lightly.
2. Determine the size of margins (and border, if any). Care must be taken that correct and balancing margins be made at this time.
3. Analyze the copy and pick out its essential features, and determine what lines must be displayed.
4. Fit the display matter in the width of line by printing the words emphasized by hand. The use of the type sheet is found exceptionally valuable at this point.
5. Minor display lines should then be drawn on the layout sheet by the above method.

Figure 2 shows a layout, drawn and correctly marked in detail on a layout sheet. Figure 3 represents the job as set from this layout.

The following layout hints will be found invaluable in planning and drawing up printed layouts:

1. Do not crowd printed matter.
2. Use one family of type, and be safe.
3. Make simplicity the chief factor in your layout.
4. See that the really important lines are displayed.
5. Use the period in display matter only when needed for the sense of the matter.
6. Use underscoring rules sparingly, if at all.
7. Do not use swash characters in the middle of words.
8. Margins for book pages should decrease in this manner: bottom, outside, top, inside. When one sheet is printed alone, the sides must be the same, and the bottom slightly larger.
9. Use very small type faces sparingly; they are difficult to read.
10. Avoid too many groups of type on the same page. Arrange in groups.
11. Avoid much decoration.
12. Use white space liberally.
13. Lower case, being more legible than caps, should be used as much as possible.
14. Rather than crowd any small lettering on the layout, label each section for reference to the copy, on which like lettering must be put.
15. Bold-face and condensed-face body matter must be avoided, as it is hard to read.
16. Display running in two lines or more should be broken so that each line has a meaning of its own.
17. Avoid overdisplay.

Approximate Words to Square Inch

Size	*Set Solid*	*Two-Point Leaded*
6 point	47	34
8 point	32	23
10 point	21	21
12 point	14	9
14 point	11	7
18 point	7	6

18. Avoid display lines of almost the same length.

19. The pyramid form of display is poor; use the inverted pyramid form.

20. Caps may be letter spaced; never letter space lower case.

21. Never use italic caps.

22. Avoid too great a contrast between display and body matter.

23. A mere spot of color is usually more effective than several lines printed in color.

24. Above all, remember that anything printed should be easily read.

The following books will give the reader many useful ideas applicable to layout work:

I. T. U. Lessons — Unit 2, Lesson 2; Job Unit 4, Lesson 8.
U. T. A. Lessons — Display.
Trezise — *Typography of Advertisements*, Chap 2.
Gress — *Art and Practice of Typography*, pages 35 to 41.
Williams — *Marking Copy for Newspaper Ad. Machines.*

Current Comment No. 1—Vocational Education in the Secondary Schools

*Homer J. Smith**

THERE must be increased provision for vocational education, broadly interpreted, in the offering of the secondary school. No agency other than a school may be supposed to meet full requirements in this respect for the individual or for society. No institutional type other than the high school can be sufficiently cosmopolitan and universal to attain the measure of such training that will be increasingly demanded. Vocational education, to be adequate, must be widespread, varied, and democratic.

We are all aware of increased enrollment and increased retention at the secondary level. It may be that a lowering average ability naturally accompanies these increases and that a premium is, therefore, placed upon content more immediately useful. As the personnel changes from a few of the children of a few of the families to most of the children from more and more homes, there must be constant scrutiny of purposes and plans. While this unit of the system, publicly or otherwise maintained, must continue to function as a preparatory institution for some who would go higher, it must be constituted for the larger and growing number a final opportunity for formal training. If one youth be guaranteed a life to *his* next goal, that of acceptance and fair chance in a college, then his playmate has the same right—under the same roof and with the same funds—to worthy preparation for *his* next step out into a competing world. Every leader in secondary education has definitely subscribed to this belief and is eager to serve in the attempt to lessen administrative difficulties. There are no insuperable obstacles; although a host of petty misunderstandings, prejudices, precedents, and inertias exist.

There would be call for changed procedures with reference to equipment, teacher selection, program building, and credit allotment. There would need to be variation of courses among schools even in the same city. Part-time arrangements, coöperative agreements, and evening and summer classes would spring from and parallel the standard schedules. Placement and coördinating activities, as well as the retraining of adults, would demand the services of overseers specially trained. Doors would need to swing wide for selected groups from adjacent, less-favored communities even as now the high schools admit from districts without such facilities. But, these are merely annoyances and difficulties tending to the denial of equal opportunity. Administrators will come to view them as challenges rather than as barriers.

The specialized vocational schools of many fields and for both sexes will continue to flourish in the great cities. They will show a changed aspect or emphasis in keeping with mechanized production and exchange. They will become more effective in up-grading and give less attention to initial preparation. Beside them will develop great technical units for study of process and management.

But, thoroughly scattered everywhere, attractive and more potent, will stand the changed secondary schools, conceived as academic for many, vocational for many more, but preparatory for all. *These* will offer greater opportunity to greater numbers — in the years that are best, near the homes, and in keeping with wide ranges of ability and interest. *These* will be the public's warrant of both general and specific development in an atmosphere calculated to produce a homogeneous society. The people will choose to make heavier investment in such schools. They will be proud to pay for vocational education under secondary auspices.

*Professor Industrial Education, University of Minnesota, Minneapolis, Minnesota.

INDUSTRIAL ARTS and VOCATIONAL EDUCATION

J. J. METZ, Editor

THE DANGER OF BEING "ALL SET"

A young industrial-arts teacher in answering an elderly, genial country-town philosopher who had asked, "Well, how are you getting along?" said, "Why, I'm getting along splendidly. It took me two years, but now I'm all set. I have a tracing for every one of my projects, and I have a sample of each project on display. I have nothing to worry about any more. I'm all set."

"So you're all set, eh?" rejoined the old man, "Well then my advice to you is, look for a new job. You have reached the end of your rope in your present position, and if you want to be a success, get another job where you will have lots of work ahead of yourself before you are again 'all set.' "

Fortunately for the young man, the old man's advice did some good. The young teacher commenced to see the danger of being *all set*.

When concrete has set, its days of usefulness may commence because it is then ready to bear the load for which it was destined, but its days of adapting itself to varying conditions of shape or size, or even of increasing its weight-bearing capacity are over.

When a load is applied to a piece of steel, deformation naturally follows, but if the load is not beyond the elastic limit of the material, removal of the load also causes the deformation to disappear. When once, however, the loading has been increased beyond the elastic limit, a permanent set has been reached which makes the use material for that load highly dangerous.

A teacher who has reached the point where he, or his course, is all set, is equally dangerous. For him the period of growth is over, and the era of stagnation and decay has started.

The old man's advice is worthy of thought therefore. "Young man, if you're all set, look for a new job."

—•—

INSTRUCTION SHEET AND TEXTBOOK

The individual instruction sheet under numerous names and in various forms is at present holding the center of the stage in industrial arts and vocational education. It is well that it does, because the individual instruction sheet is a teaching device that promises to solve the problem of individual differences more successfully than any other that has yet been proposed.

Just what the final form of this teaching device is to be cannot as yet be foretold. The instruction sheet is still in the process of development and those who are using it are confronted by the arduous task of choosing the particular form in which they want to write their material from the numerous types and kinds that have so far been devised.

To produce a good instruction sheet requires a skill that is possessed by but few, yet the country over there are many teachers who are laboriously working at the task of producing this lesson material. It is unfortunate that much of that which is produced hardly justifies the time that was spent on it. Of course, the movement is young and it is quite natural that much waste effort will be expended before an adequate solution of the problem can reasonably be expected. It is nevertheless proper to consider ways and means to avoid this waste and to make the task of the pioneers in the work a little less arduous and more simple.

The production of an acceptable unit instruction sheet requires a great deal of preliminary work and planning. There is, first of all, the determination of what is to be accomplished in a given unit. In other words, a definite objective for each unit has to be set up.

Then the method of conveying the subject matter has to be decided; informational material has to be gathered, collated, and arranged; problems selected; tests devised; the whole written up plain, understandable English; and finally — if possible — it is to be illustrated with halftones, or line drawings, or both. All of this takes time and care and effort, and as already stated, only the exceptional teacher can do it properly.

Taking the foregoing into consideration, most school systems are not in a position to produce this work in the best manner because of the expense that is involved. Take the matter of illustrations alone. Most duplicating devices used for this type of work, outside of the printing press, do not permit the use of the halftone, although most of them will take care of line drawings.

Halftones are practically necessary, however, because so many phases of shopwork and so much of the informational and related material can best be illustrated by means of them.

Then there is the matter of gathering information about the related matter. This, too, is troublesome and time-consuming and therefore beyond the capabilities of most of the busy shop teachers who are harassed by problems of large classes, many periods, extracurricular duties, and shop-maintenance jobs that continually arise. The question that confronts the teacher then is how best to tide over the transition period which necessarily lies between the advent of a fully developed line of modern unit instruction sheets and the demise of the old-time textbook. The answer to this is surprisingly simple. There are many well-written and well-illustrated textbooks available which, though not in the form of instruction sheets, may yet be used as the core about which individual instruction sheets may be written by the teacher. Of course, it will be necessary to thoroughly study the chosen text so that in writ-

ing the individual lessons proper references may be made.

Adopting this system will at once cut down much of the teacher's labor and at the same time offer the student material that will be in an acceptable shape.

HUMOR IN THE CLASSROOM

"A good laugh," someone said, "clears the cobwebs off the brain."

Figuratively speaking, that statement pictures quite well what happens. Worries and troubles, the cobwebs that occasionally surround or befog one's mental outlook, disappear as if by magic after a hearty laugh. Like a beneficial rain that clears the atmosphere, a good laugh relieves the strain which the worry of the moment may have induced.

This is true in all of life's situations and therefore ought not to be lost sight of in the classroom and in the school shop. Of course, humor must be wisely used, and it is plain that humor, inopportunely used, might induce unbridled hilarity which would quickly wreck school discipline. Students seem to know instinctively, however, just how far they may go in the enjoyment of a privilege with a teacher who is really a boy leader.

The right kind of humor in the classroom makes the teacher less an austere boss and more a good fellow whose good will is worth cultivating. It also is a fine influence in the lives of students who may come from homes where poverty, illness, parental neglect, marital disappointment, or just plain ignorance, produce a somber, gloomy atmosphere that acts as a depressing influence on all the members of the family.

Humor also is a great help in disciplinary cases. There is probably no greater whip for the recalcitrant bully than to have his classmates laugh at him rather than with him. With the bully, who is usually cocksure of the things he does, treatment of this kind may set up inhibitions that are worth while. They may make him a better member of the group, and later a better citizen. The laughter of a roomful of boys, of course, would be exceedingly dangerous when directed at a timid boy. Hence the wise teacher will be careful to repress humor that makes sport of the weak or the backward.

If humor is so valuable in life, then it is well to make a conscious effort to direct it into the right channels, and for this purpose the schoolroom is the proper place. If every teacher could thoroughly appreciate this, the future men and women the world over would have more pleasant memories of their school days, while the teachers would benefit by having more cheerful lives and more ease of mind.

THE BLESSING OF WORK

Why can't I do what John Jones did? How often is this question asked by people who wonder why others have been more successful than they.

Thoughts of this kind frequently lead to envy and probably even to hatred, and spitework. There are historic examples where friends parted because fortune was more generous to one than to the other.

It is very often rather puzzling to decide why one man should rise more rapidly than another. The seemingly successful one may not have more education, or more skill, or more brilliancy than the one whom he passes in the race of life, and yet he has something which marks him as the superior.

A study of the lives of successful men shows that plain work usually had a decided influence in securing success for the individual. It is true, chance plays a part in the lives of men but its influence is not nearly so great as some credit it to be. Work, real endeavor, perseverance, however, are sure to show their influence, especially if they are combined with careful thought and planning.

That work should play such an important part in a man's success is not surprising because it has a surprising effect on him who really labors. Conscientious effort requires concentration, and concentration makes one forget annoying trivialities which in themselves might and do frequently divert the expenditure of energy into other channels.

The person who bemoans his fate and spends his time in envious comparisons really is hampering the chances of his success because he is thereby using up valuable time that might be spent in real work that would help to bring him nearer to his goal. Work, were it but better understood by the many, would not be looked upon as the lot of the unfortunate. Carlyle said, "Blessed is the man who hath found his work and is doing it." In his idea there are two things that are required to make man blessed, to have found "his work" and to be "doing it."

These factors, then, are the things that are required and they hold good for the lowliest laborer and the highest intellectual. To have found his work does not necessarily mean that the individual has found the easiest work that might exist, but it does mean that he has found work into which he can put his full efforts with the feeling that the effort is worth while.

The one who can find no pleasure in his work, therefore, can expect but little success. He can likewise expect but little happiness. Success and happiness are the rewards that go out only to him "who hath found *his work* and is *doing it*."

EVENING SCHOOL

The success of an evening school depends on the instructors. The man with a strong personality, who knows his trade, who has practical methods of instruction, will make a good teacher. Nothing is more useful to a worker, or to a teacher of workers, than a knowledge of what the job really means.—*J. V. Hamilton.*

Vitalizing Manual Training

*Frank D. Luddington**

WE hear much these days about enlivening the school's curriculum and presenting our history, English, languages, and science in a more interesting and acceptable fashion. Those of us teaching shopwork are fully aware of this new trend of things, but there are many instructors who are of the opinion that this is something not intended for, or necessary in the case of manual training.

There is no mistaking the fact, that manual training is received with great enthusiasm by the students of the upper grades, and it is certainly possible to accomplish much with them if their inexhaustible fund of energy is properly directed and their interest stimulated and held.

From the student's standpoint, the project upon which he is set to work is the all-important factor and the speedy completion of it, his paramount aim. The teacher, on the other hand, should have certain objectives in mind which he hopes his students will in time attain, and the problems which he prepares for his classes are not ends in themselves, but simply vehicles to carry the pupils nearer to the goals set for them. It is in the choice of these problems that the instructor may instill enthusiasm and interest into his classes.

In Proctor, last fall, the seventh grade was set to work on a series of animals. The bodies were of ⅞-in. stock; the heads of ¼-in. stock which was set into the bodies. The animals were presented in a sequence, each being a little more difficult than the former and the students were all given an opportunity to do a little painting, which, to be sure, was quite simple, as there was no attempt made at elaborate decorating. This kind of project along with the usual talks and demonstrations gave the beginners a fine start and was received with great gusto by the boys of the seventh grade.

The eighth graders were given an 18-in. model of Byrd's South Pole plane as a starter. Here was a real example of vitalizing, for every newspaper, magazine, and movie constantly fanned the students' enthusiasm to a white heat. They worked with the utmost care and attention to detail and produced models which were a credit to the manual-training department. Even now, as they hang from the ceiling of many a boy's room, they are radiating romance and adventure to their owners.

A detailed model of Lindbergh's plane, which was really quite difficult to construct and finish properly, was chosen for the freshmen. Like the Byrd model, this problem was eagerly pursued by the boys, and the instructor was constantly besieged with requests to work after school and Saturday mornings.

Interest when once aroused may easily be sustained, and problems in concrete, sheet metal, weaving, and the like, are in order. A bird-house contest in the early spring peps things up a bit and later, when approaching summer beckons to the restless, a model rowboat, constructed just as a real rowboat is constructed, never fails to sustain interest to the end.

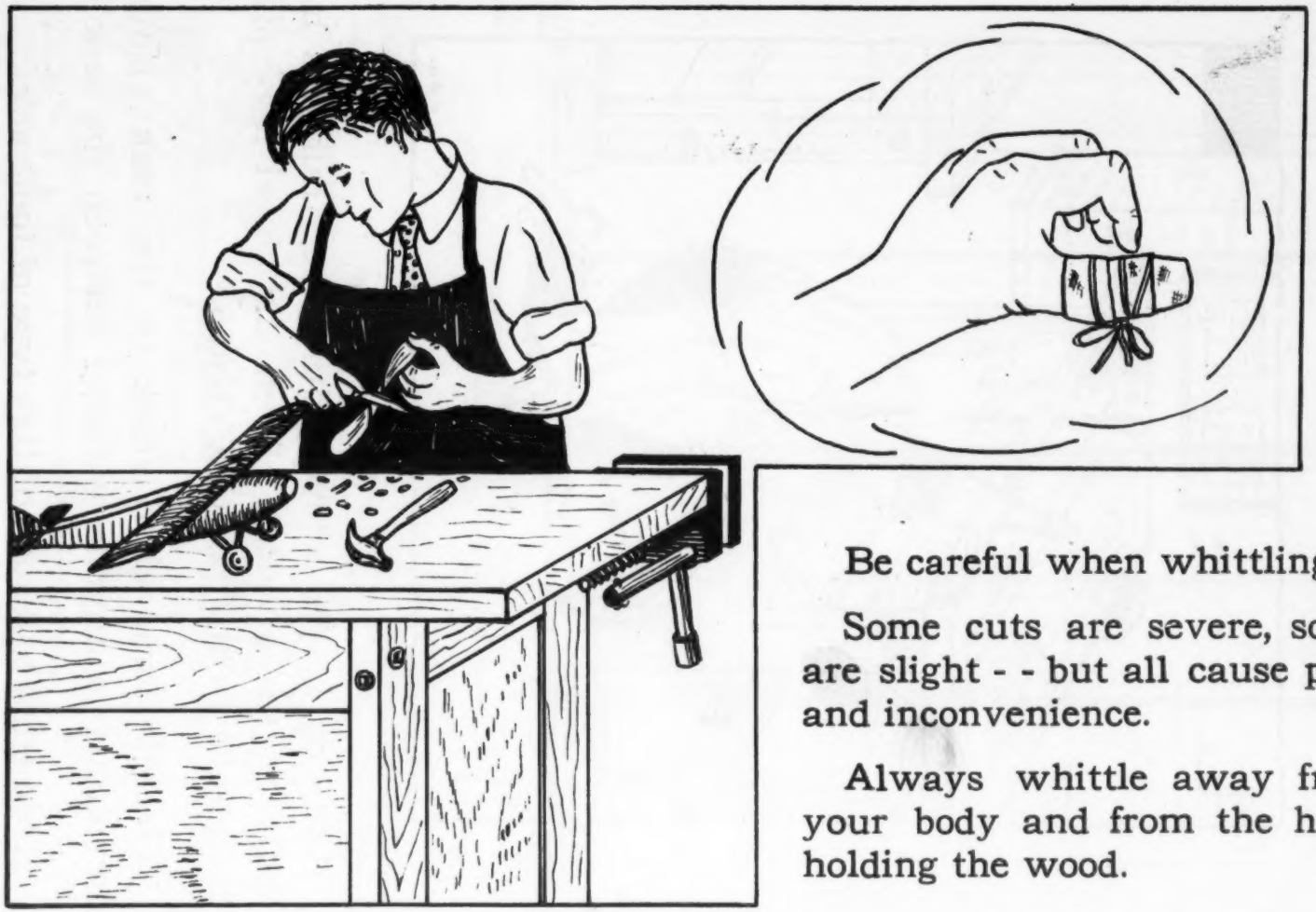
A set program of projects seems to be most satisfactory for the seventh grade and the first half year of the eighth grade, after which the students are able to choose problems more wisely, and the individual project idea begins to work very nicely. Even in the case of the freshmen in high school, a common problem for all at the beginning of the year starts the shop wheels turning in unison and gives both students and teacher an opportunity to prepare for the individual projects thereafter. Above the freshmen class the groups are usually smaller, and the older boys may be relied upon to have a worth-while project in mind at the opening of school, or very soon thereafter.

The writer is of the firm conviction that the shop teacher should not rely solely upon a few dusty books for his material, but inject some of the romance and vitality of the boys' world into his shop problems.

END TABLE, DESIGNED BY HARRY L. BARTA, BAY VIEW HIGH SCHOOL, MILWAUKEE, WISCONSIN

*Proctor, Vermont.

WHITTLING



Be careful when whittling.

Some cuts are severe, some are slight - - but all cause pain and inconvenience.

Always whittle away from your body and from the hand holding the wood.

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Submitted by Jos. J. Lukowitz, Milwaukee, Wisconsin

Arising From A Stooped Position

The boy in the above picture may hurt his head badly on the dividers. Even the chisel may prove dangerous in the position shown.

The dividers, when stuck in the rack also are dangerous to anyone walking between the benches.

Keep edge tools out of this type of tool rack.

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Submitted by Jos. J. Lukowitz, Milwaukee, Wisconsin

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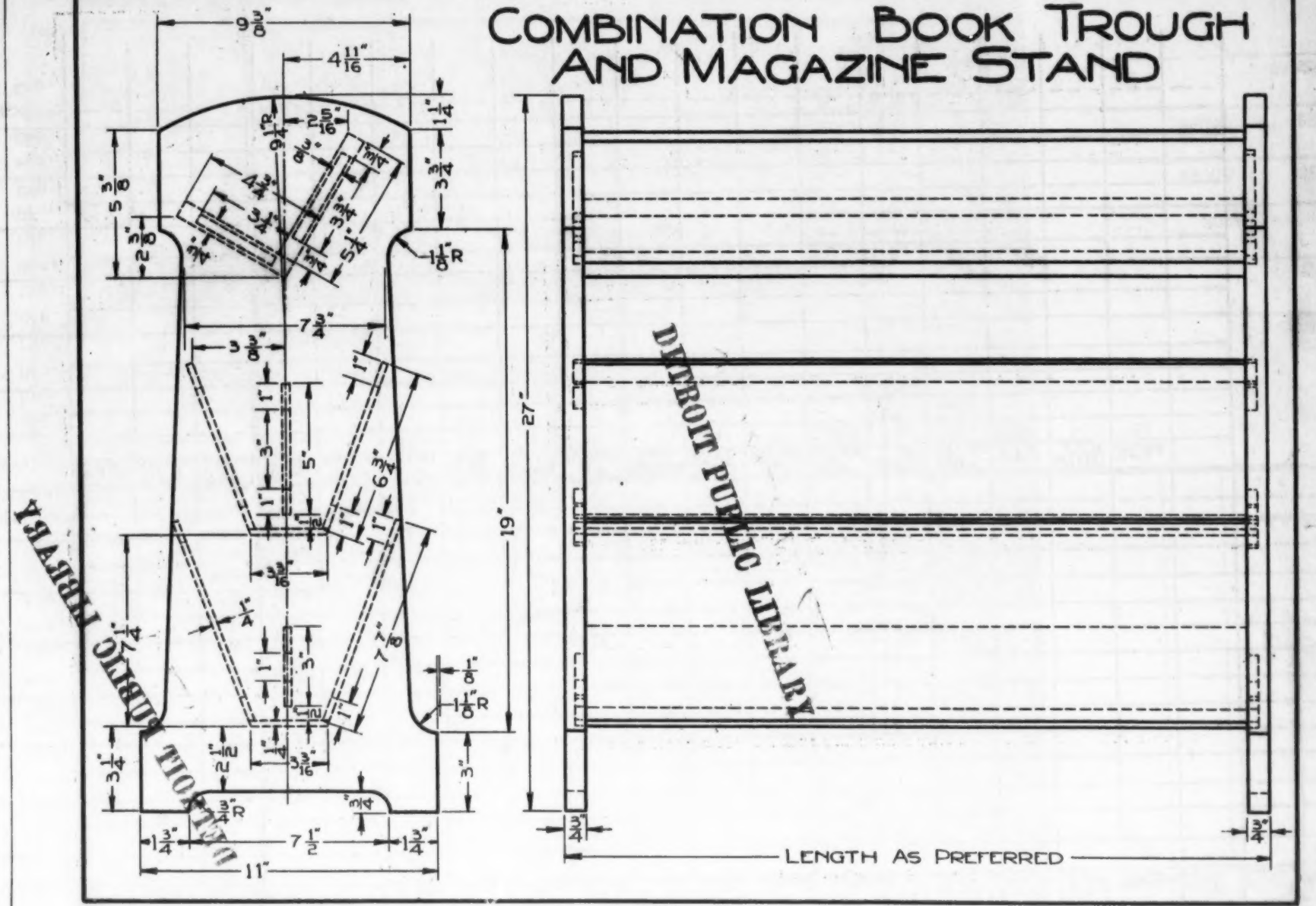
COMBINATION BOOK TROUGH AND MAGAZINE STAND



Designed by Frank E. Anthony, Erie, Pennsylvania

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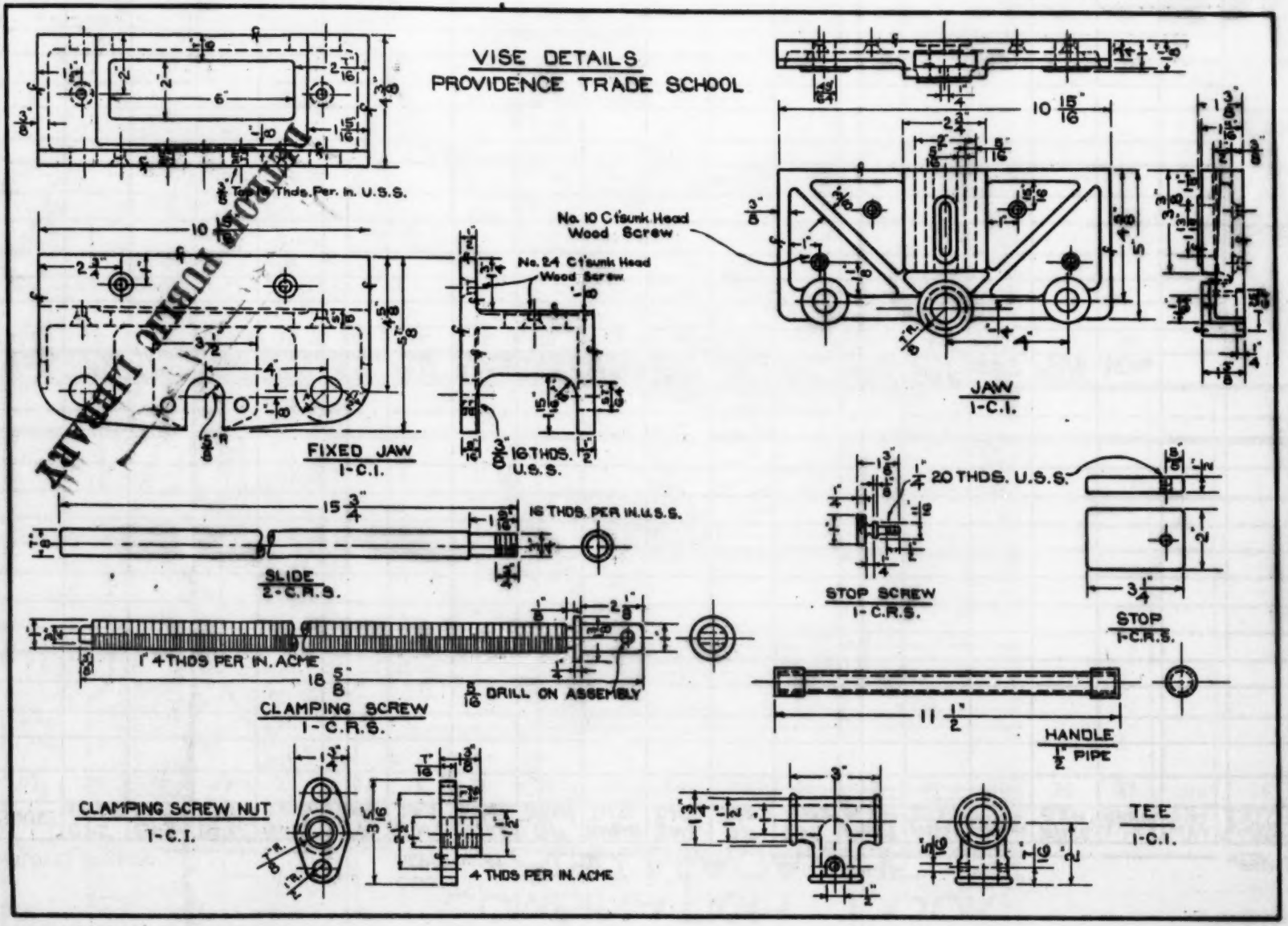
VISE DETAILS
PROVIDENCE TRADE SCHOOL



Submitted by Chester A. Ruoff, Providence, Rhode Island

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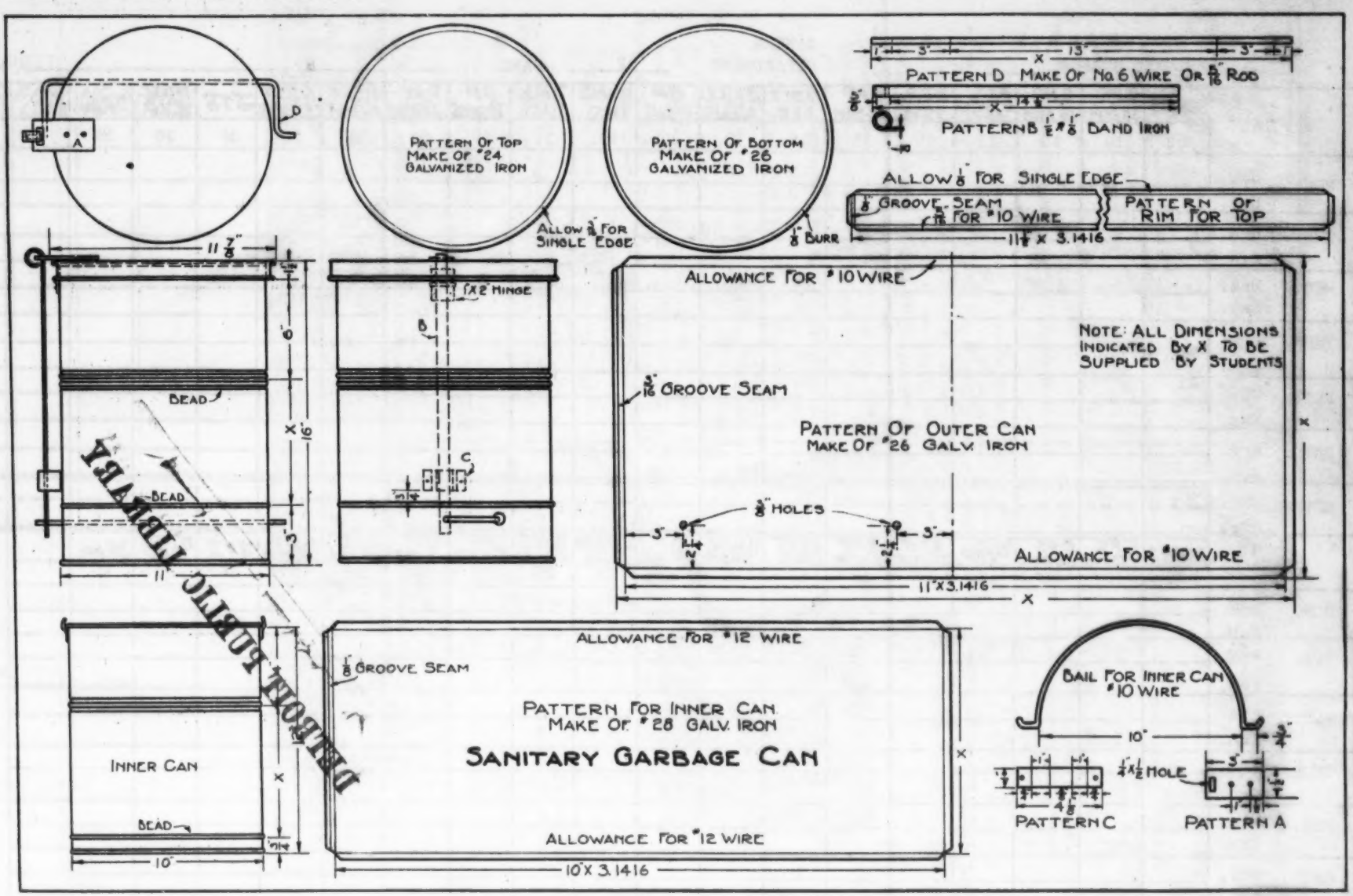

Designed by Edward Stein, Buffalo, New York

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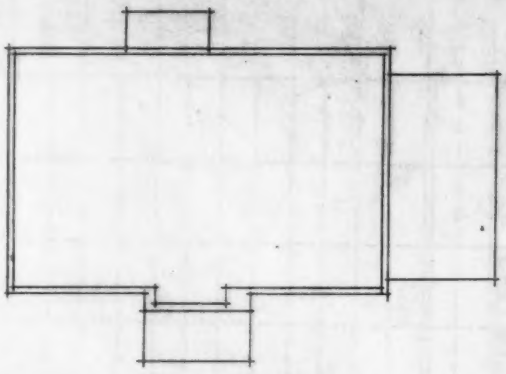
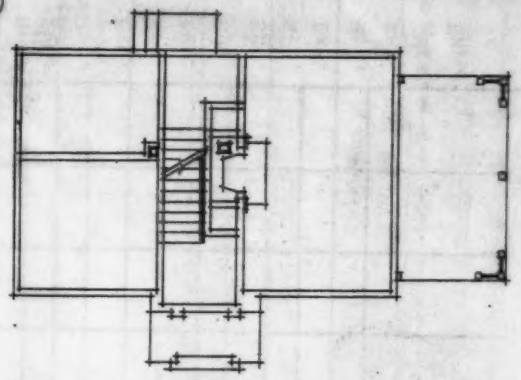
PROCEDURE FOR DRAWING A FLOOR PLAN

1



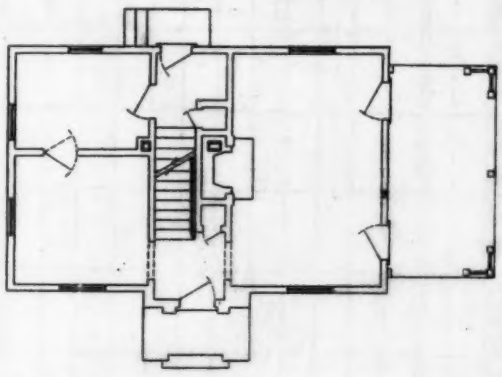
BLOCK OUT THE OUTSIDE WALLS AND THE OUTLINE OF THE PORCHES.

2



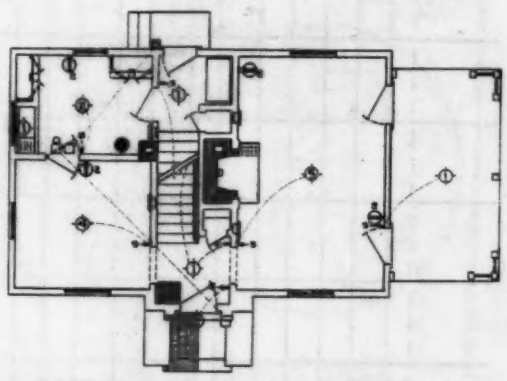
DRAW IN THE PARTITIONS, STAIRS, AND CHIMNEYS.

3



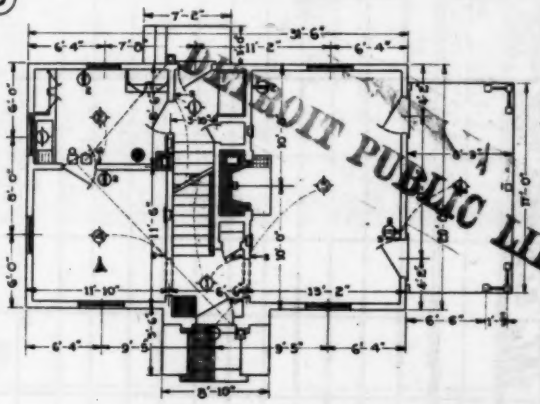
DRAW IN ALL OF THE DOORS AND WINDOWS.

4



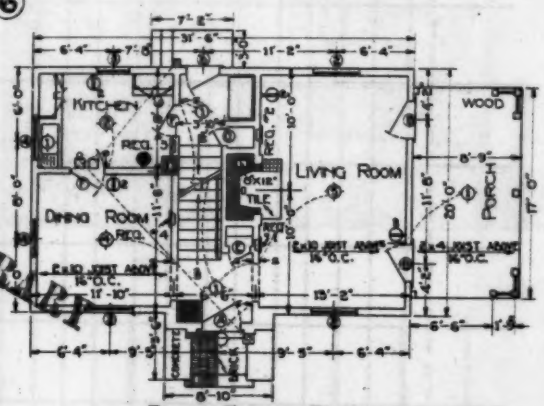
SHOW THE ELECTRICAL AND GAS OUTLETS, THE FIREPLACE, BUILT-IN CUPBOARDS, KITCHEN AND BATHROOM FIXTURES, CLOSET SHELVING, HEATING SYSTEM, ETC.

5



DIMENSION COMPLETELY. GIVE THE LOCATION OF PARTITIONS, WINDOWS, OUTSIDE DOORS, FIREPLACE PORCHES AND PORCH COLUMN, ETC. GIVE OVER-ALL HOUSE DIMENSIONS.

6



FIRST FLOOR PLAN

PUT IN THE NOTES AND THE NAMES OF ROOMS. MAKE THE SCHEDULES FOR THE DOORS AND WINDOWS, THE TITLE AND SCALE OF THE DRAWING, AND THE NAME PLATE.

DETROIT PUBLIC LIBRARY

TRACING SUPPLEMENT No. 214, MAY, 1931
INDUSTRIAL ARTS AND VOCATIONAL EDUCATION

Submitted by H. H. Robinson, August

PROBLEMS AND PROJECTS

COMBINATION BOOK TROUGH AND MAGAZINE STAND

Frank E. Anthony, East High School, Erie, Pennsylvania

(See Supplement No. 211)

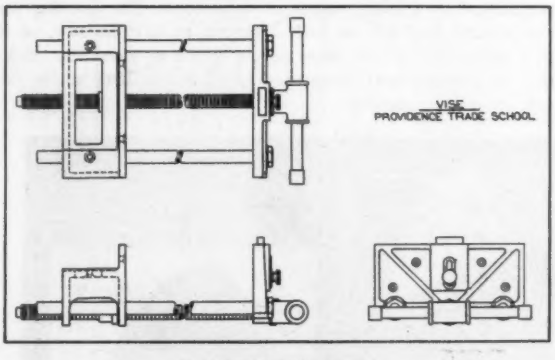
Any piece of furniture of new or unusual design always has a strong appeal for boys who are in woodworking classes. It is probably for this reason that the combination book trough and magazine rack shown in the accompanying drawing has been so very popular in the writer's classes. Of course, each student is urged to exercise his individuality, hence he is urged to improve the design shown in the illustration before attempting to build his project. One student may choose to change the general outline of the ends, another may elect to make his magazine rack of slats instead of a single board, a third may construct his book trough in "V" shape rather than "L" shape, and still another would possibly include all of these changes. Of course, no student is permitted to proceed with his work without having the instructor check up to make sure that all material is available. But even though the instructor may offer suggestions for changes they should be offered tactfully as suggestions, and the student should be made to feel that the design is his own. Each student also is given the opportunity to select the style of finish desired.

A WOODWORKING VISE

Chester A. Ruoff, Trade School, Providence, Rhode Island

(See Supplement No. 212)

Practical projects for the drafting room can furnish practical projects for the pattern shop, machine shop, and the paint shop. The vise illustrated herewith was designed in the



WOODWORKING VISE

drafting room to comply with the need of the manual-arts department. When the drawings were completed they were blue-printed and sent to the pattern shop to furnish a project for the patternmakers. The patterns were then sent to the foundry and the castings returned to the machine shop. A lot of 25 vises was made, and they furnished excellent machine-shop projects in gang planing, screw cutting, shaper work, milling; assembling, and numerous other operations. When the vises were assembled the paint shop had a lesson in enameling.

SANITARY GARBAGE CAN

Edward Stein, Adjustment School No. 50, Buffalo, New York

(See Supplement No. 213)

The sanitary can is an excellent review problem for the sheet-metal class, as it brings into use nearly every major hand tool and machine process used in sheet-metal work. It covers soldering, riveting, grooving, wiring, beading, burring, forming, drilling, punching, setting down, double seaming, use of brake, and use of squaring shears, besides the use of the common hand tools including the cold chisel, hollow punch, center punch, and setting-down hammer.

SANITARY GARBAGE CAN

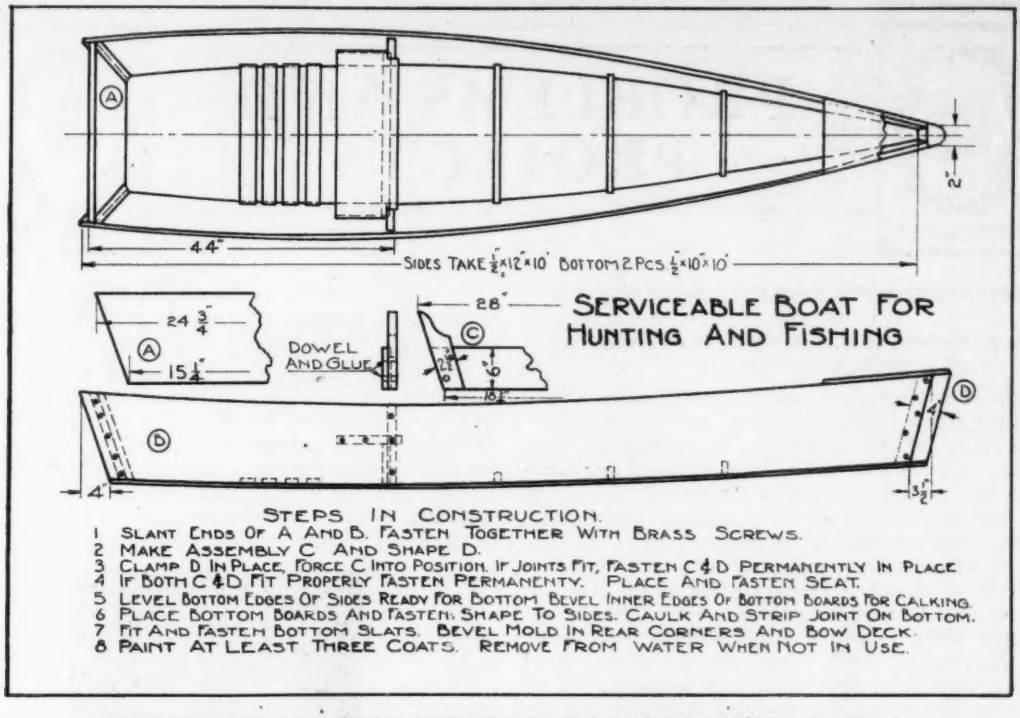
When a student has completed the program of study containing projects with one or more of the above-mentioned processes as objectives, he is permitted to make the sanitary garbage can. Every student has found it an interesting project because of its practical value in the home. This project, as already stated, proves a valuable check to see whether the boy has mastered the required processes on previous jobs, and also whether the instructor has put across his points clearly.

The student uses three different gauges of galvanized iron, and two gauges and sizes of band iron in this project. He has to make use of his knowledge of circumferences, volumes, and allowances for seams and edges.

Letting the student obtain his measurements and impressions from a finished model add to the value of making this project a good review problem. The directions which follow are general, and the student must work out his own plan of action as he is acquainted with most of the details of procedure from experiences gained on previous jobs.

The construction consists of taking all measurements from the finished model, and computing the amount of metal needed for each part. The body of the outer can is made of No. 26 galvanized iron with wired edges at the top and bottom. The holes for the foot lever are punched before forming the body. The bottom is beaded in 3 in. from the bottom of the can and soldered. The top or cover is made of No. 24 galvanized iron, and the rim of No. 26 galvanized iron. A single edge is used to fasten the rim.

Pieces A and C are made of the strap iron that comes around the bundles of sheet iron. Piece B is fitted to piece A and made to work loosely. A 1 by 2-in. wrought-iron hinge is riveted to the cover rim and bolted to the can. The nuts are tightened on the outside and soldered after all adjustments are made. The foot lever may be made of No. 6 galvanized


44"
SIDES TAKE ½x12"x10' BOTTOM 2 PCS ½"x10"x10'
24 3/4"
15½"
DOWEL AND GLUE
28"
SERVICEABLE BOAT FOR HUNTING AND FISHING
STEPS IN CONSTRUCTION.
1 SLANT ENDS OF A AND B. FASTEN TOGETHER WITH BRASS SCREWS.
2 MAKE ASSEMBLY C AND SHAPE D.
3 CLAMP D IN PLACE. FORCE C INTO POSITION. IF JOINTS FIT, FASTEN C & D PERMANENTLY IN PLACE
4 IF BOTH C & D FIT PROPERLY FASTEN PERMANENTLY. PLACE AND FASTEN SEAT.
5 LEVEL BOTTOM EDGES OF SIDES READY FOR BOTTOM. BEVEL INNER EDGES OF BOTTOM BOARDS FOR CALKING.
6 PLACE BOTTOM BOARDS AND FASTEN: SHAPE TO SIDES. CAULK AND STRIP JOINT ON BOTTOM.
7 FIT AND FASTEN BOTTOM SLATS. BEVEL MOLD IN REAR CORNERS AND BOW DECK.
8 PAINT AT LEAST THREE COATS. REMOVE FROM WATER WHEN NOT IN USE.

DESIGNED BY ARNOLD L. PEARCE, SUPERVISOR MANUAL TRAINING, ROSWELL, NEW MEXICO

wire or of a 5/16-in. rod formed and fitted to B, making sure the cover is slightly off balance forward before drilling hole in B. Cleat C is riveted using measurements from model.

The inner can is made of No. 28 galvanized iron. The bottom can be double seamed or snapped into a bead.

Inspect all seams and bottoms for leaks, file all rough edges and then finish the outer can with a coat of paint of a suitable color.

A NEW IDEA IN PICTURE FRAMES

C. Anthony Van Kammen, Grand Rapids, Michigan

The picture frame offered in this article is ideal for holding photographs. It is a very good advanced seventh-grade problem, but it is equally suitable for the boy in the eighth grade. In the frame shown in Figure 3, the angular tenon used on the frame in Figure 2 is replaced by an angular butt joint, reënforced by two small brackets or braces. The list of materials follow:

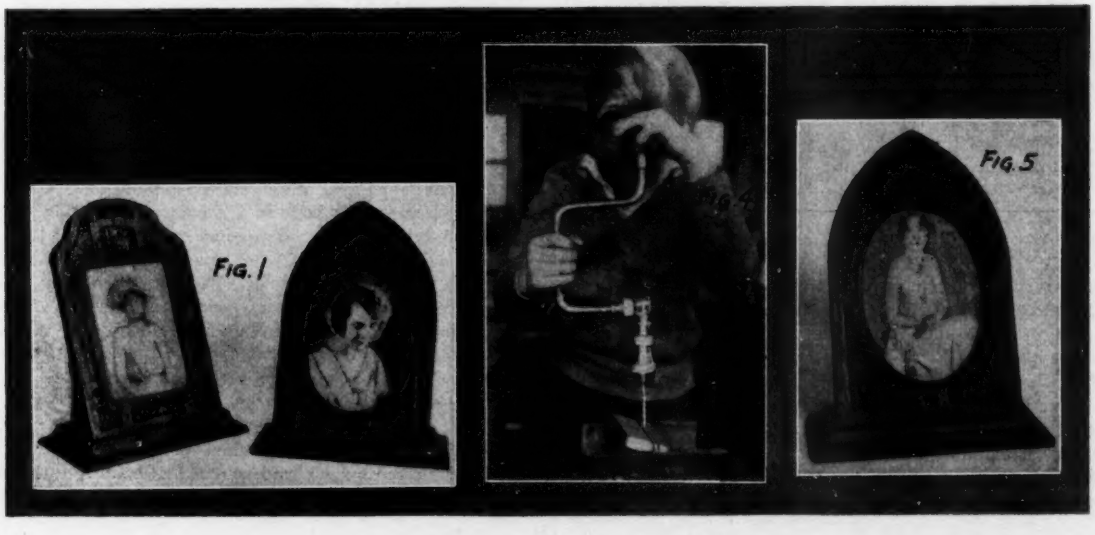
List of Materials for Figure 2

1 pc.	½ x 4½ x 7¾	Basswood
1 pc.	⅝ x 2⅝ x 5¾	Basswood
1 pc.	1/16 x 4¾ x 8	Mounting Board

List of Materials for Figure 3

1 pc.	½ x 4½ x 7	Basswood
1 pc.	⅝ x 3⅛ x 5¾	Basswood
2 pc.	¼ x 1 3/16 x 3½	Basswood
1 pc.	1/16 x 4¾ x 8	Mounting Board

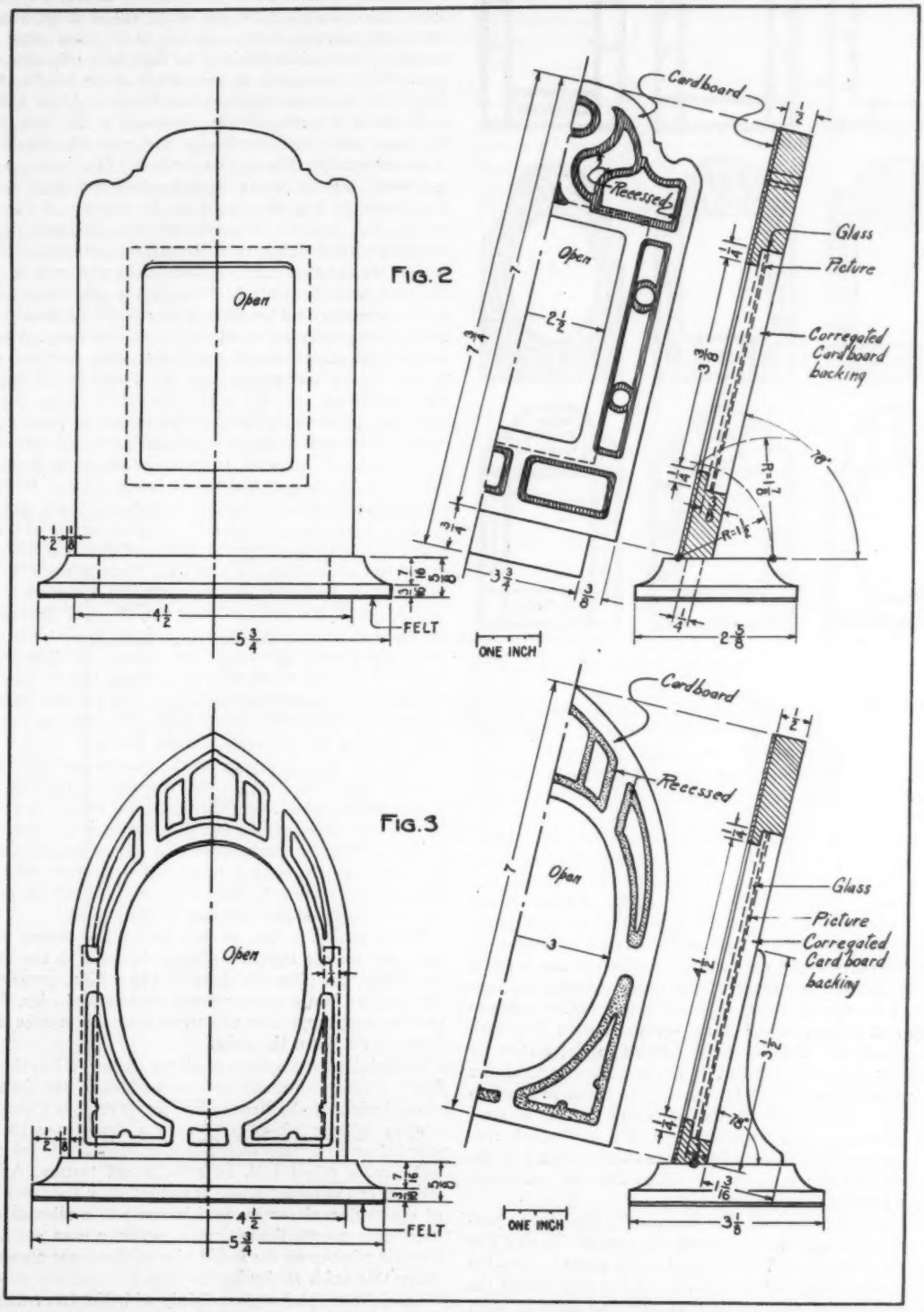
As a woodworking problem the picture frame has much in its favor. It uses a minimum of wood yet requires the repeated use of a large variety of hand tools. The opening for the picture may be cut with a coping or keyhole saw, or it may be cut out at the band saw, a spline of wood the thickness of the saw kerf being used to fill in the kerf where the saw enters the opening.



Carving gouges are used to cut the surface enrichment from card mount stock which is later glued to the front surface of the frame. In some cases the background of the wood surface also is tooled with veining tools. In order that more time may be given to designing the contours and surface enrichments, stock for the frame and base should be cut to very near finished size so that little hand planing will be necessary. The making of a full-sized drawing also should be required of every member of the class. Though every boy in my classes constructed one or more of these picture frames, no two workers had exactly the same designs.

Figure 4 shows a number of designs for contours and surface enrichments made by seventh graders. In its simplest form the enrichment is formed by a series of ¼-in.-wide bands which divide the surface of the frame into areas that have a pleasing relation to each other. This requires a workable knowledge of the principles of good design.

Designs F and G show designs for oval picture openings.



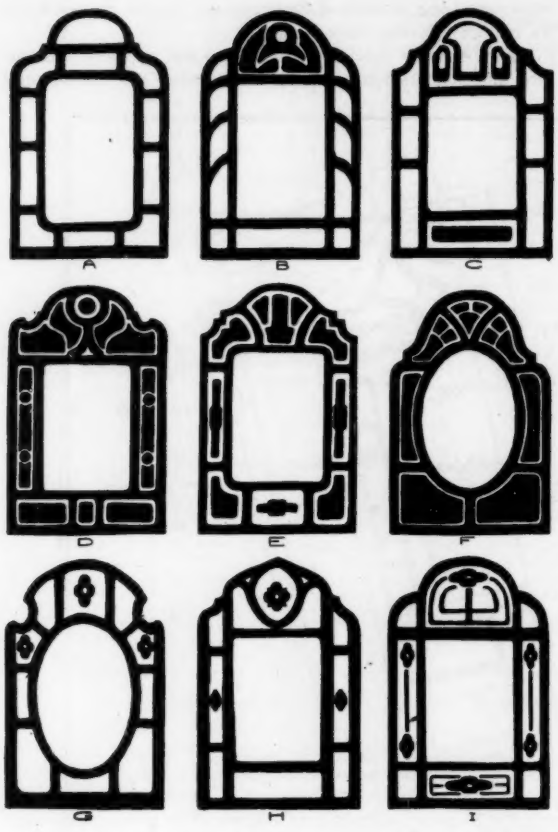


FIG. 6. A NEW IDEA IN PICTURE FRAMES

Design D shows a background that is to be tooled with a veining tool (see also Fig. 5). Another method of finishing the background is to tool it with a mottling tool as used by wood carvers. The background of the design also may be stippled with gesso compound made of powder chalk or whiting and orange shellac.

As soon as the drawing is completed, the boy may begin on his woodwork. Plane the frame stock to width and thickness but leave it 1½ in. longer than the finished length. Lay out the tenon. The tenon with the angular shoulder is cut first as it is quite likely that the first effort will not prove entirely satisfactory. The extra length permits the worker to try again on the same piece of stock. As soon as the tenon is completed lay out the shape of the frame opening and contour from the original paper pattern. On the central axis near the top and bottom of the frame opening bore a hole with a ¾-in. auger bit. Cut the frame opening to size with a jig saw, coping saw, or band saw. If the band saw is used, the contour should not be cut until after the spline is glued in place. Many of the contours do not permit the use of hand screws because of their irregular shape. The kerf may be cut in the tenon end but this would require some chiseling of the spline stock to size up with the tenon. File and sandpaper the band-sawed edges smooth.

Pencil gauge on the back face from inside the frame opening, a line ¼ in. all the way around the opening. Be sure this is done on the back face. With the marking gauge set to 3/16 in., gauge from the front face, a line all the way around the inside of the frame opening. With a chisel and gouge or both, depending upon whether the frame opening is oval or rectangular, rabbet out the edge to receive the glass and picture. Make all deep cuts across the grain first so as not to split the stock. Finish by paring with a gouge and chisel as necessary to smooth up the surfaces of the rabbeted edge.

After the tenon and frame opening have been successfully completed, the band saw or proper hand tool may be used for cutting the frame stock to contour. File and sand if necessary. The frame section is now ready for the surface enrichment. Cut a piece of card mount to a slightly larger size than the frame (see stock bill). The end which will be at the bottom of the frame should have the edge cut at the same angle as the shoulder of the tenon. This may be done with a framing square and a sharp knife held at the proper angle, handle inclined away from the straightedge so that the knife blade will make an undercut. Thumb-tack the cardboard to the front face of the frame with the finished edge flush with the shoulder and at the same angle. Placing the cardboard face down on a cutting board, use the proper carving gouges and chisel and trim the cardboard face exactly to fit the contour of the frame and opening. Remove the cardboard from the frame face, and trace the surface design from the original pattern to the front face of the cardboard. If you have made any error in sawing to the contour lines of the frame stock, slight changes may now be necessary on the pattern to make the original contour and surface design fit satisfactorily on the wood. After corrections are made, cut out the design. Take care not to lose any of the cut-out sections that are needed to fill in part of the large areas.

If the background is to be carved or tooled, thumb-tack the cut-out cardboard to the wood frame again, and with a sharp pencil trace the outline of the design on the wood. Remove the cardboard and carve or tool the surface as desired. When completed sand lightly and glue the cardboard surface enrichment in place. Take care to see that the original surface of the cardboard is face up on all pieces. Use cold glue and avoid using more than is necessary to hold each piece in place. Chipping surplus glue from the surface spoils the appearance of the finished piece. Place a section or two of paper toweling over the finished work and clamp face down against the smooth surface of a piece of wood. If two frames just alike are made by a boy, the two pieces may be clamped face to face with a few layers of paper toweling between to prevent them from adhering to each other. Tiny brads will keep the cardboard from slipping as the work is being clamped.

While the glue is drying on the frames the bases may be started. Hold the stock in the vise end to end and at the proper angle so that when the brace and bit are in a vertical position the holes will be bored in the base as required (see Fig. 4). Finish up the mortise with the correct-sized chisels. Be careful not to force a tenon into a mortise which is cut too small to receive it. Very little stock is left on each end of the mortise and the base may be easily split.

Finger gauge the lines on the top face and around the sides and ends for the chamfer. Clamp the stock in the vise, not too tightly, and plane the chamfer. Use a ⅞-in. gouge to form the chamfer into a quarter-round cove-molded edge. File and sand as necessary. Glue the tenon into the mortise and the frame is ready for the finish.

Give the work two coats of orange shellac. When these have dried, stipple the entire back and edges of the frame, and also all parts of the base except the cove with a shellac and whiting mixture which is of such a consistency that when stippled on a surface with a stiff-bristled brush the mixture will remain raised with an even, rough texture. A thinner mixture of the same "gesso" is painted upon the front surface of the cardboard surface enrichment and is allowed to level itself into smooth though not a perfectly even surface. Use the thin mixture on the inside edge of the frame opening also. Allow this finish to dry hard.

Sand the stippled surface lightly with No. 00 or finer sandpaper, to remove the real sharp point. Sand the smooth or front face of the frame and the cove on the base very smooth. These smooth surfaces should be given a nice even coat of shellac before the frames are gilded. With a dusting brush or a large paint brush, remove all dust from the surface of the

frame. The job is now ready for the finishing coat of pale-gold paint.

Add about one-third spar varnish to the bronzing liquid when mixing the gold paint. This binds the gold powder and prevents it from coming off during the antiquing process. This latter consists in toning the cheap gold appearance with a mixture of burnt umber and turpentine. If color is desired in addition to the gilt, it should be painted on the recessed background and allowed to dry before the toning color is applied. Brush the toning color over the entire frame and wipe it off immediately with a piece of paper toweling held flat. This leaves a shaded brown color on all the low places while the high spots are "high lighted" or wiped clean. When the work is dry, a piece of felt should be glued on the base. This may be cut to exact size with a knife when the glue has set. Apply the glue to the wood, not the felt.

Suitable glass for the frames may be cut from old photographic plates. Make a template of three-ply ¼-in. veneer with the proper size opening to fit the oval frame and run the glass cutter inside the template. Make a few cuts to the outer edge of the glass from the oval scratch on the glass and no difficulty will be encountered in cutting the necessary shapes and sizes. Two fine brads will hold the glass in place. Wipe the glass clean on the back face. Cut and fit the picture and back it with a piece of corrugated packing board. To give a nicely finished effect, glue a piece of golden-brown cover paper to the back, thus completing the job.

AN ELECTRIC HOT PAD

Charles Rice, North Junior High School, Everett, Washington

The electric hot pad described herewith is a project that is within the scope of junior-high-school students. It is a project that arouses interest and furnishes a lesson in resistance besides being a useful article after it is complete.

1. Cut a piece of asbestos cloth 12 by 15 in. in size.[1]

2. Draw border lines ½ in. from the edges of asbestos cloth and divide the space into two areas, as shown in Figure 1.

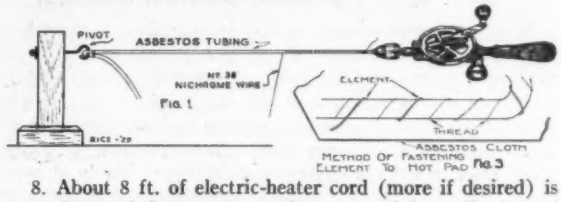
3. Cut two pieces of asbestos tubing, each piece 6 ft. long.

4. Measure off two pieces of No. 38 nichrome wire, each piece to be 15 ft. long, and wind this upon a spool or piece of wood.

5. Leaving a free end about 6 or 8 in., of wire at the end of the first piece of asbestos tubing, the nichrome wire is wound about the tubing, leaving about ¼ in. between each turn, until the other end is reached, where a free end of wire should be left the same as at the beginning.

6. Repeat the process for the second piece of tubing, forming a coil about the asbestos tubing with the two free ends for connections. A piece of wire or small rod stock inside the tubing and fastened in a hand drill will aid the winding (see Fig. 1).

7. After the two coils are completed, they should be sewed to the asbestos cloth, according to the diagram shown in Figure 2. A good grade of linen thread should be used and some care is necessary to have the coils well spaced in each area. Figure 3 shows how the linen thread is used to fasten down the coils in a manner that prevents it from ever coming in contact with the hot element wires.



8. About 8 ft. of electric-heater cord (more if desired) is next taken and the cotton covering removed for a distance of about 14 in. The insulation is then removed at the places indicated and the copper wire well scraped with a knife.

9. The free ends of the nichrome wire are carefully wound about the copper wire at the places indicated in the illustration to insure a good connection. No attempt should be made to solder these connections nor should they be wound with tape.

10. Sew the rubber-covered leads securely to the asbestos cloth with linen thread, as much strain is exerted on the cord.

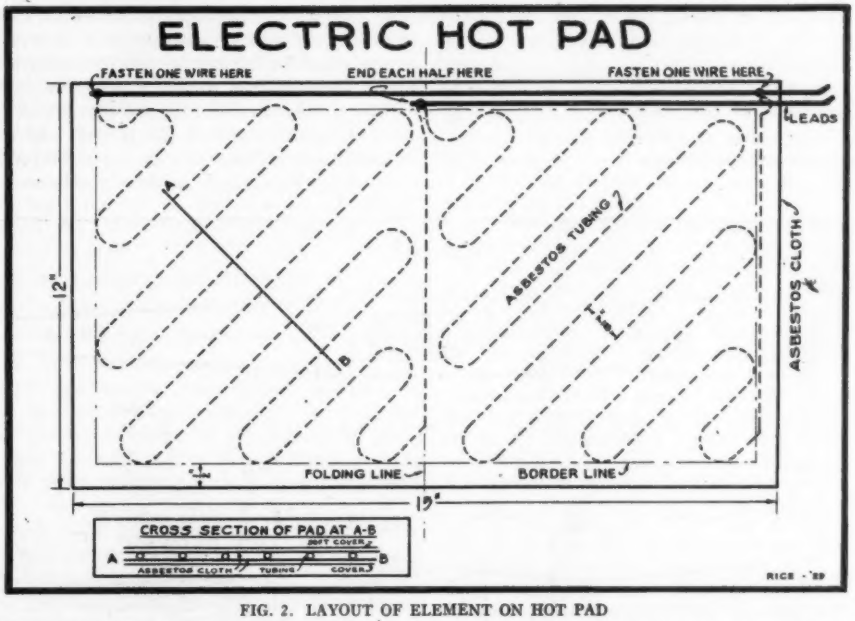


FIG. 2. LAYOUT OF ELEMENT ON HOT PAD

11. At this point it should be determined if the pad is to remain flat or be doubled.

Directions for Making the Hot Pad

If a flat pad is to be made, cut a thin piece of asbestos paper to the size suggested by the border lines on the cloth and place it over the element. A piece of canvas, slightly larger than the asbestos cloth is next placed on top and the edges of the canvas firmly bound over the edges of the asbestos cloth and sewed by hand.

If the pad is to be folded double, a piece of asbestos cloth is cut 7½ by 11½ in., i.e., one half of the size of the pad.

[1]Asbestos materials may be purchased in large rolls from Johns-Manville Corp., 292 Madison Ave., New York City.

The cloth holding the element is then folded over at the center and the piece of asbestos cloth placed between the two heating surfaces and the edges of the pad firmly sewed.

12. The material that is to be used for the bag containing the asbestos-covered element should be sewed on a machine. Sew the bag inside out, leaving enough of the seam open for turning and for placing the element within. Later the remainder of the seam is sewed by hand.

13. A feed-through switch is next placed on the electric cord about 2 or 3 ft. from the pad, and a plug is attached to the end of the cord.

14. A cheesecloth covering is often pinned over the bag to keep it clean.

A TIMESAVER FOR THE WOOD FINISHER

Frank L. Hatley, High School, Grandview, Washington

When steel wool is used to rub down shellac or varnish, a fine steel dust remains on the surface so treated. This dust can easily be removed on open surfaces with a cloth slightly moistened with gasoline. It is difficult, however, at times to effectively remove it from the corners and crevices of intricate and small work, even when a brush is used. A magnet taken from an old Ford magnetic field is very handy to overcome this difficulty, as it quickly and effectively removes all of the fine steel particles from even the most inaccessible places.

A BRAD HAMMER

E. C. Youngbluth and W. A. De Vette, Erie, Pennsylvania

In the machine shop there is always a demand for projects which will be useful after they have been completed. The brad hammer meets this requirement, its future use in nailing fillets in patterns and core boxes in the school pattern shop having been one of the considerations when it was designed as a machine-shop project.

The operations involved in making the hammer are not too difficult for junior-high- or continuation-school boys.

The material required for a hammer is 1 piece of tool steel, ⅝ by ⅝ by 5¼ in., and a handle which may be turned by students in the woodshop or purchased.

The operations in order are as follows:

1. Cut stock to the required length.
2. Center both ends.
3. Lay off the shoulder distances.
4. Straight turn to the required diameters.
5. Taper turn.
6. File and polish.
7. Cut off center holes.
8. Face the ends.
9. Lay out the hole for the handle.
10. Drill out the stock.
11. File the hole to shape.
12. Bend the taper end hot.
13. Harden and temper.

THE IMPORTANCE OF METAL

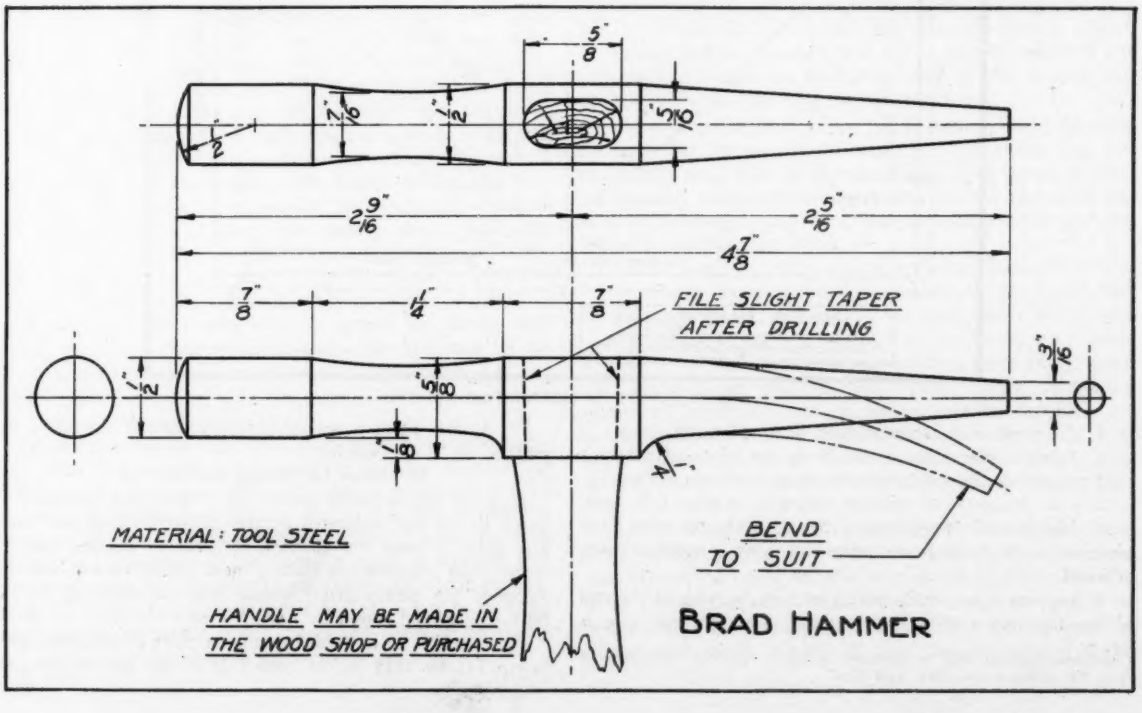
Alfred B. Grayshon, Cooke Junior High School, Philadelphia, Pennsylvania

While man in earlier days toiled with his hands, using the strength of his muscles as the only power upon which he could depend, the man of today has at his finger tips an almost unlimited supply of power. The modern man is mechanically a giant.

We frequently read of the modern miracles of our times. Is it not a miracle that a quantity of hematite ore, hardly more compact than sand, can be converted into machines which will enable man to conquer the forces of nature? This machinery helps man to sow and harvest his crops, harness the power of water, build towering skyscrapers in the city, bridge rivers, propel airplanes, carry scores of people on fast trains and ships, and perform many otherwise seemingly impossible tasks and generally make labor easier.

The ability of mankind to work metal and shape it to his use is an important part of the advancement of the human race and is the foundation of the age of metal in which we live. Our present and future developments in transportation, manufacture and agriculture are dependent upon the earth's abundant resources of metal ores and man's knowledge about and skill in forming them into thousands of shapes. All other materials are more or less dependent on metal. Without it our cities would be impossible, our food supply would be inadequate and our lives would be comparatively isolated.

The metal-manufacturing industry in its various phases is without question one of the greatest and most vital in this country, and millions of men are employed in the manufacture of products which are largely composed of metal.



A Coöperative Study Fostered by the A. V. A. Committee on Standards[1]

Part I — An Important Announcement

*William T. Bawden**

In taking over the chairmanship of the A.V.A. Committee on "Standards of Attainment in Industrial-Arts Teaching," at Professor E. E. Ericson's request, I wish first to pay tribute to the splendid achievements of my predecessor in this office. To him is due the credit for conceiving the plan of a working committee to attack this problem, and for skilled leadership in organizing and directing its activities during the past three years. Because the study which confronts this committee of the A.V.A. is big enough to tax the combined resources of the entire field, and important enough to enlist the active interest of everyone, Professor Selvidge has been asked to take the leadership in analyzing and organizing the fundamental units of instruction.

The two magazines, INDUSTRIAL ARTS AND VOCATIONAL EDUCATION and *Industrial Education*, have been invited to coöperate in furnishing the means of publicity and communication. The committee will furnish a series of brief articles, prepared by Professor Selvidge, dealing successively with the subjects outlined by the committee, to both magazines. These articles will be published in accordance with a schedule which provides that approximately one half will appear first in one magazine, and the remainder will appear in the other; but both magazines will publish the complete series.

The outline for "Woodworking" follows; other outlines will appear later.

This study offers a unique opportunity to every shop teacher and supervisor in the country to have a part in a great undertaking. No matter what course of study the individual teacher may follow, no matter what methods of teaching he may employ, no matter what textbook he may be using, or no textbook, he cannot escape organizing his work on the basis of some plan of "fundamental learning units." The effort to determine what these units are constitutes the subject of this study.

Every shop teacher will profit by the results of this study, whether he helps or not; but everyone may take an active part in it if he cares to help.

Part II — Plan for Coöperative Analysis of Trade and Industrial-Arts Subjects

*R. W. Selvidge***

A great deal of work has been done by teachers in attempting to analyze and list the learning units involved in the various trade and industrial-arts subjects. These efforts have been isolated, however, with little opportunity for individuals to exchange ideas and receive the criticisms or suggestions of others; hence relatively little progress has been made.

The value of such a list of learning or teaching units is obvious. It gives very definite objectives which are quite apparent to both teacher and pupil, and it becomes a relatively simple matter to develop tests to determine the progress of the pupil in learning them. When the pupil has a definite list of things to learn, and knows he will be tested on each one and receive a proficiency mark when he has made a satisfactory record, a very desirable learning situation results.

Such a list also furnishes a basis for determining whether the jobs contain the elements that are to be taught, or to discover what the learning units are in a given job. This is necessary so that the jobs may be chosen wisely, and to insure that those chosen really cover all the items that are to be emphasized and that they give the required amount of practice in each item.

Such original lists should be reasonably complete, and probably would contain a greater number of units than would be taught in any one school, but the teacher should select from this master list the particular learning units which he wishes to teach in his classes.

It is impossible to say definitely what units, and how many of them, should be included in all courses of woodworking, for the reason that the time devoted to woodworking varies in different schools from one hour a week to fifteen hours a week, and from one semester to six semesters. It also appears in all grades from the sixth to the twelfth. In view of this situation it seems best to prepare a very complete list of learning units and to permit the teacher to select from the list the items which he can teach in the time allotted and with the equipment provided. If a record is kept of the proficiency of the student in these units, the extent of his accomplishments is readily determined without respect to the time spent or the projects worked on.

How the Individual Shop Teacher Can Help

On account of the importance of such an analysis as a basis of effective teaching the following plan for coöperative effort is proposed.

1. Every teacher who is interested in such an analysis should join in this undertaking.
2. All industrial-arts subjects, as taught in the high school, are to be analyzed, for the learning units involved.
3. That the principal skilled trades are to be analyzed for the learning units involved.
4. Tentative analyses of the selected subjects, or trades, are to be published and distributed as rapidly as may seem practicable.
5. Any shop teacher or supervisor who is willing to coöperate, or to offer suggestions in the way of modifying, adding to, or taking from, the original list, should send such suggestions or comments to R. W. Selvidge, University of Missouri, Columbia, Mo., or to William T. Bawden, Peoria, Ill., chairman of the committee.
6. Suggestions thus received should be carefully studied, edited, and incorporated, as far as possible, into the original lists, and the revised lists published, together with the names of those who coöperate.
7. Those who are interested should send in the analysis of any subject, or trade, which they have prepared, and which may be used by the committee as the basis of the preliminary analysis. This form of coöperation will be of great value in getting more satisfactory preliminary lists of units.

In order to get the project started, a tentative analysis of "Woodworking" follows. Those who are interested in coöperating in this matter are asked to study this outline with the view of adding to it anything that should be taught which is not in the list and striking out anything which should not be taught. Teachers should feel free to change the wording of any item to make it more definite, or more inclusive, or more exclusive.

In the study of the tentative analysis the best plan for the teacher is to take some of the jobs which he is using in his shop and analyze them with regard to this list of learning units. Perhaps the easiest way of doing this is to place the

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[1]Personnel of the A.V.A. Committee on Standards:
William T. Bawden, Chairman, *Industrial Education Magazine*, Peoria, Illinois.
Charles F. Bauder, Board of Education, Philadelphia, Pennsylvania.
Clyde A. Bowman, The Stout Institute, Menomonie, Wisconsin.
Emanuel E. Ericson, State Teachers College, Santa Barbara, California.
Maris M. Proffitt, U. S. Office of Education, Washington, D. C.
William E. Roberts, Board of Education, Cleveland, Ohio.
Robert W. Selvidge, University of Missouri, Columbia, Missouri.

*Managing Editor of *Industrial Education Magazine*.

**University of Missouri, Columbia, Missouri.

learning units in a vertical column, the jobs in a horizontal column, and check each unit in the column in which the job appears. *There must be definite working drawings and specifications for each job, or a correct analysis is impossible.* If it is found that the jobs contain learning units not in the list, such units should be added.

Part III — A Tentative Analysis of Woodworking

*R. W. Selvidge**

Since woodworking is one of the most common industrial-arts subjects, and since more teachers are familiar with it than with any other subject, this tentative analysis is made the first of the series. The following learning units are, or may be, taught in high-school courses in woodworking. The list does not cover the learning units involved in carpentry as a trade, nor is it confined wholly to structural problems or to the manipulative processes involved in the use of woodworking tools. Some learning units dealing with wood finishing are included in this list because some wood finishing is usually taught in connection with high-school courses in woodworking and is regarded as an essential part of such a course.

*University of Missouri, Columbia, Missouri.

Learning units involving other materials, such as sheet-metal and electric work, should be included in a woodworking course, but those that seem desirable may be selected from the other lists of learning units which will appear later.

Woodworking courses in the past have been too narrow, and the experiences provided have not given contact with a sufficient number of materials. There is no more reason for excluding other materials from a course in woodworking than there is for excluding all reference to history from a course in literature. As a matter of fact, much has been lost in value and practical usefulness of both academic and industrial-arts subjects by the "logical" and exclusive divisions which have been adopted for subject matter.

The list of learning units, as far as the student is concerned, should be divided into three principal groups: *The things he should be able to do, the things he should know,* and *the things he should be.* The first group involves *manipulative skill, knowledge of procedure,* and *construction processes.* The second group involves *information concerning qualities and characteristics of materials,* and other matters of general interest in the field. The third group involves *attitudes and habits* which affect the success of individuals. They probably are the same for all subjects.

The Learning or Teaching Units

The things he should be able to do:

1. To read a working drawing.
2. To make out a bill of material.
3. To plan the procedure in doing a given job.
4. To check material when received.
5. To use a rule in measuring and dividing spaces.
6. To lay out pattern on stock.
7. To check the layout.
8. To use dividers, or compass, for laying out curves and dividing spaces.
9. To gauge with a pencil.
10. To gauge with a marking-gauge.
11. To use a try-square for testing.
12. To use a try-square for laying out square cuts.
13. To adjust a jack plane or a smooth plane.
14. To adjust a block plane.
15. To plane a surface true.
16. To plane an edge square with an adjoining surface.
17. To plane end grain.
18. To square up a board.
19. To saw to a line with crosscut or ripsaw.
20. To use a backsaw.
21. To use a coping saw for inside or outside curves.
22. To use a compass saw.
23. To use a turning saw.
24. To round edges.
25. To finish outside curves.
26. To finish inside curves.
27. To drill holes with an auger bit.
28. To countersink holes.
29. To bore holes with an auger bit.
30. To fasten with screws.
31. To use bradawl for making holes for screws or nails.
32. To trim or pare with a chisel.
33. To use a gouge for gouge work.
34. To use a scraper.
35. To use sandpaper properly.
36. To use a wood rasp for shaping ends, edges, and curves.
37. To drive and draw nails.
38. To set a nail or brad.
39. To use a T bevel.
40. To use a spokeshave.
41. To lay out an octagon.
42. To lay out a hexagon.
43. To lay out an ellipse.
44. To lay out and cut a chamfer.
45. To prepare glue.
46. To glue up work.
47. To use hand screws and clamps.
48. To put on locks.
49. To put on drawer pulls.
50. To fit hinges.
51. To put on ball catches.
52. To apply stain.
53. To clean and care for stain brushes.
54. To apply stain for two-tone effect.
55. To apply fillers.
56. To apply shellac.
57. To clean and care for shellac brushes.
58. To apply wax.
59. To apply varnish.
60. To clean and care for varnish brushes.
61. To apply enamel.
62. To clean and care for enamel brushes.
63. To apply lacquer.
64. To clean and care for lacquer brushes.
65. To use a spray gun.
66. To give a fumed-oak finish.
67. To apply paint.
68. To clean and care for paint brushes.
69. To transfer a design.
70. To apply inlay.
71. To lay out irregular design by means of squares.
72. To lay out duplicate parts.
73. To make a butt joint.
74. To make a notch joint.
75. To make a half-lap joint.
76. To lay out and cut a dado joint.
77. To cut a groove or a rabbet.
78. To lay out and cut a cross-lap joint.
79. To lay out and cut a miter joint.
80. To make a dowel joint.
81. To lay out and cut a blind mortise-and-tenon joint.
82. To lay out and cut a through mortise-and-tenon joint.
83. To lay out and cut a haunched mortise-and-tenon joint.
84. To construct a panel.
85. To make a splined joint.
86. To lay out and cut a house joint.
87. To make an edge-to-edge glue joint.
88. To lay out and cut tapers.
89. To make a drawer slide.
90. To make and fit a drawer.
91. To fasten on a table top.
92. To fasten with lag screws or bolts.
93. To cut an edge mold.
94. To do simple upholstering.
95. To sharpen edge tools, such as a knife, chisel, and plane.
96. To sharpen a screw driver.
97. To sharpen a scraper.
98. To sharpen auger bits.
99. To sharpen a saw.
100. To keep tools free from rust.

Only learning units involving hand processes have been listed, but many schools teach the use of woodworking machinery. The learning units for machine woodwork are based upon the individual machines.

The Jointer

1. Safety rules for operating jointer.
2. Range of work which may be done on jointer.
3. How to care for and adjust the machine.
4. How to joint an edge.
5. How to cut a chamfer or bevel.
6. How to make a spring joint.
7. How to surface narrow stock.
8. How to take the wind out of a board.
9. How to cut a rabbet.
10. How to cut tapers.

The Circular Saw

1. Safety rules for operating saw.
2. Range of work which may be done on the saw.
3. How to care for and adjust the saw.
4. How to rip.
5. How to cut off.
6. How to cut grooves.
7. How to cut dadoes.
8. How to cut tenons.
9. How to cut miters.
10. How to cut tapers.
11. How to resaw.

The Band Saw

1. Safety rules for operating the band saw.

2. Range of work which may be done on the saw.
3. How to care for and adjust the saw.
4. How to saw curves.
5. How to rip.
6. How to cut off.
7. How to cut tenons.

The Surfacer

1. Safety rules for operating surfacer.
2. Range of work which may be done on a surfacer.
3. How to care for and adjust the surfacer.
4. How to adjust for depth of cut.
5. How to adjust and control feed.
6. How to feed work into machine.

The Sander

1. Safety rules for operating sander.
2. Range of work which may be done on the sander.
3. How to care for and adjust the sander.
4. How to operate sander on flat work.
5. How to operate sander for curved work.

The Mortiser

1. Safety rules for operating mortiser.
2. Range of work which may be done on mortiser.
3. How to adjust and care for mortiser.
4. How to set and adjust chisels and bits.
5. How to feed work.
6. How to make set-up for duplicate parts.

The Turning Lathe

1. Safety rules for operating lathe.
2. Range of work which may be done on the lathe.
3. How to adjust and care for the lathe.
4. How to center stock.
5. How to mount work between centers.
6. How to rough down with a gouge.
7. How to smooth with a skew.
8. How to lay off pattern on piece.
9. How to size with a sizing tool.
10. How to mark off with skew.
11. How to use a cut-off tool.
12. How to cut shoulders with a skew.
13. How to cut tapers with a skew.
14. How to cut beads or convex surfaces with a skew.
15. How to scrape with a skew.
16. How to scrape with diamond point and scraping tool.
17. How to measure with outside calipers.
18. How to measure with inside calipers.
19. How to cut concave curves with gouge.
20. How to make and use templates.
21. How to mount work on a faceplate.
22. How to mount work on a screw chuck.
23. How to size work on a faceplate.
24. How to hollow out work on the faceplate or screw chuck.
25. How to fasten pieces together temporarily for turning.
26. How to cut off stock in the lathe.
27. How to sandpaper in the lathe.
28. How to apply finish in the lathe.
29. How to make a hollow chuck and mount work in it.
30. How to make a spindle chuck and mount work on it.
31. How to make a set-up for duplicate parts.

The Things the Student Should Know

I. *Concerning Lumber*

1. You should be able to identify the following kinds of lumber and any other kinds in common use in the community: The pines, spruce, cypress, oak, walnut, birch, maple, mahogany, red cedar, hickory, gum, chestnut, poplar.
2. You should know the principal characteristics, the working qualities, the principal uses, and the sources of supply of each.
3. You should know the methods of cutting and milling lumber.
4. You should know how lumber is dried.
5. You should know the effect of moisture on wood.
6. You should know the standard dimensions of lumber and how classified.
7. You should know the nominal and the actual dimensions of lumber.
8. You should know how veneer and plywood are made, and their uses.

II. *Concerning Finishes*

1. The object of finishes.
2. The kinds of finishes in common use, such a stain, oil, wax, shellac, varnish, lacquer, enamel, paint.
3. Durability of different finishes.
4. The conditions or places in which various kinds of finishes may be used to advantage.
5. Materials from which finishes are made.

III. *Concerning Glue*

1. The kinds of glue.
2. The preparation of glue.
3. The conditions and requirements in use.

IV. *Concerning Nails, Brads, and Fasteners*

1. The kind of nails.
2. The uses of the different kinds.
3. The sizes of nails.
4. How nails are sold.
5. How nails are manufactured.
6. Sizes of brads and how sold.
7. Sizes, kinds, and uses of corrugated fasteners.
8. Sizes and uses of clamp nails.

V. *Concerning Screws*

1. The kind of screws.
2. The uses of the different kinds.
3. How the sizes and kinds of screws are indicated.
4. How they are sold.

VI. *Concerning Sandpaper and Steel Wool*

1. The kinds of sandpaper.
2. Grades of sandpaper.
3. Principal uses.
4. Grades and uses of steel wool.

VII. *Concerning Styles of Furniture*

1. The distinguishing characteristics of different types of period furniture.

VIII. *Concerning the Design of Furniture*

In the design of furniture you should develop a fair judgment with respect to the following:

1. Is it adapted to the use for which it is intended?
2. Is it structurally good?
3. Is it well made?
4. Are the structural members in good proportion?
5. Does it have an appearance of stability?
6. Is the structure as a whole well proportioned?
7. Are the outlines pleasing?
8. Is it well finished with an appropriate finish?

IX. *Concerning Manufacture of Wood Products*

1. The location of important manufacturing concerns.
2. The division of labor in the industry.
3. The use of automatic machinery.

X. *Concerning Joints*

1. Types of joints, where used, and why.

XI. *Concerning Hardware*

1. Types of latches and where used.
2. Types of hinges and their uses.
3. Types of locks and where used.
4. Types of nails and where used.
5. Special types of fittings.

XII. *Types of Tools and Their Uses*

Saws, planes, knives, chisels, hammers, boring-tools, files.

XIII. *Kinds of Grinding and Sharpening Stones, Their Grades and Uses*

XIV. *Opportunities and Requirements in Carpentry and Woodworking Trades*

What the Student Should Be[1]

The following is a list of desirable attitudes and habits which will contribute to the student's success in life. Only he individually can develop them, and he should be led to consciously practice them until they become fixed habits.

I. *Industry.* This means a habit of careful, thoughtful work, without loitering or wasting time.

II. *Coöperation.* This means an attitude of readiness to assist others when they need help, and to join in group undertakings.

III. *Consideration of others.* This means a thoughtful attitude in the matter of making things easy and pleasant for others, such as keeping things in order, putting tools away in good condition, and always doing one's full share of work where others are involved.

IV. *Self-reliance.* This attitude is a very important factor in success. It means that the individual should develop the habit of planning his tasks carefully and thoughtfully, and carrying them out with the least possible assistance. The student should be sure the problem is too difficult before he calls for help.

V. *Readiness to assume responsibility.* This means that the individual should not refuse to undertake a task because it is difficult, and when once undertaken he should carry it through to completion.

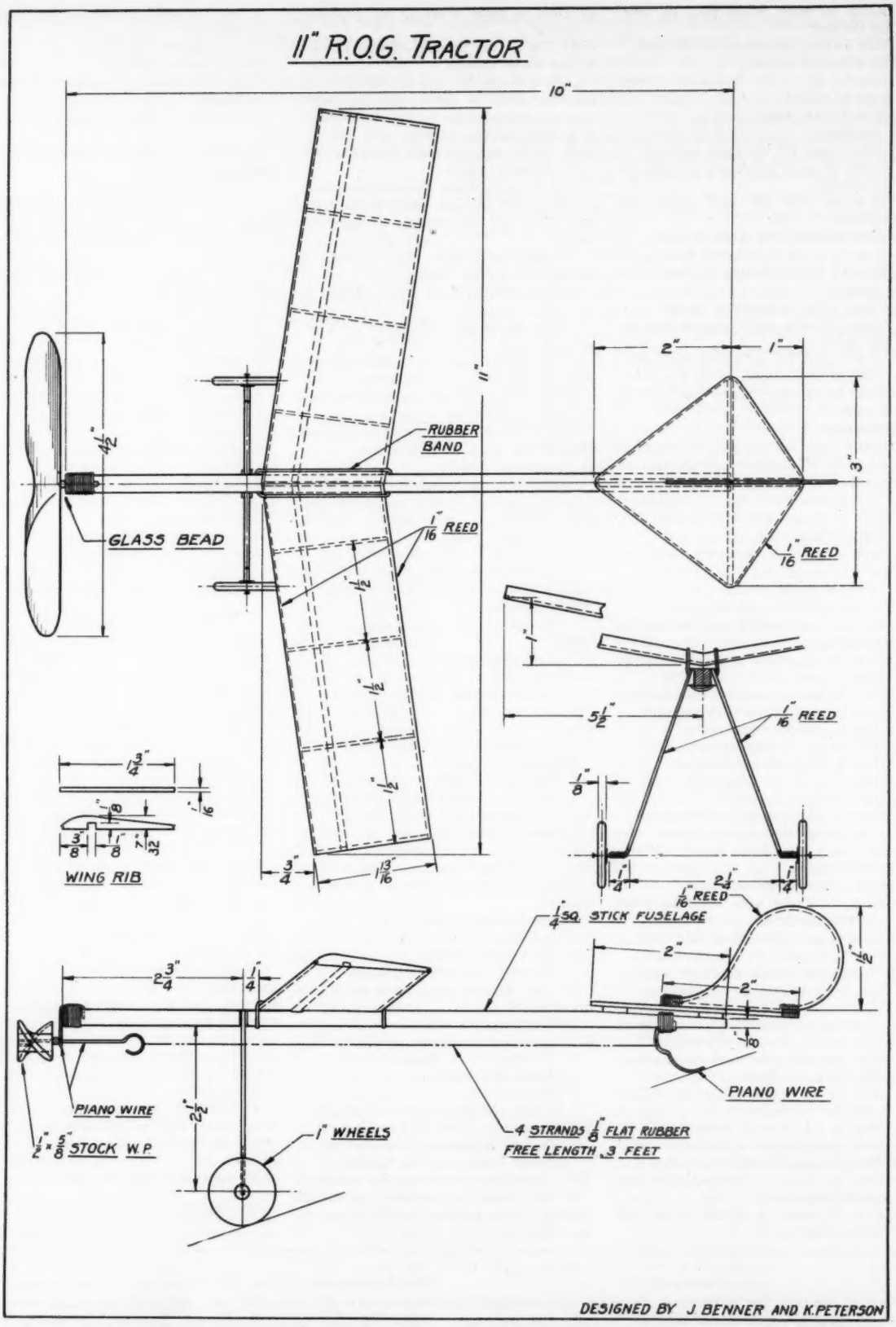
[1]The items in this list are common to all industrial subjects and will not be listed in subsequent analyses as it would be a mere repetition.

Conclusion

One of the principal difficulties in making up these lists is the tendency, in nearly every instance, to make the units too large and too indefinite, or to make a unit include things which ordinarily would not come together in instruction.

It is well to emphasize that these learning units are not to be taught as separate and unrelated things. Certain units, like *How to sharpen a saw* or *How to sharpen a plane*, do not belong to any particular job and may well be taught as individual learning units. In general, however, interesting and worth-while jobs involving these units should be used as a means of teaching.

Teachers are asked to make suggestions and render help in this coöperative plan.



ELEVEN-INCH R.O.G. TRACTOR

W. A. De Vette, Erie, Pennsylvania

The model airplane shown in the accompanying illustration is one which will well repay the time and effort spent in its construction. It is intended for indoor flying and has made some excellent flights. The slope at the rear end of the stick fuselage is changed when necessary to adjust the balance to attain level flight rather than moving the wing forward or backward.

All the wood used in construction should be balsa with the exception of the propeller, which should be clear white pine.

The drawing is sufficiently self-explanatory, so no detailed description of construction need be given.

A WASTE-PAPER BASKET

D. E. Kellogg, East High School, Erie, Pennsylvania

Waste-paper baskets have been a standard product since sheet-metal shops were introduced into the public schools. So far as outward appearance is concerned, the basket shown in the accompanying drawing is very little different from all the others that have been made by the boys. In reality, it differs from the other designs in the following features. All parts can be made complete before any of the assembling process begins. The four separate panels offer an opportunity for decorative design that may be correlated with the art department. The basket is so constructed that by removing the corner strips, it can be taken apart and packed for shipment in a very thin package. This makes it convenient for student use, or for gift purposes.

The detailed instructions for making this waste-paper basket are as follows:

A. Preparing stock.

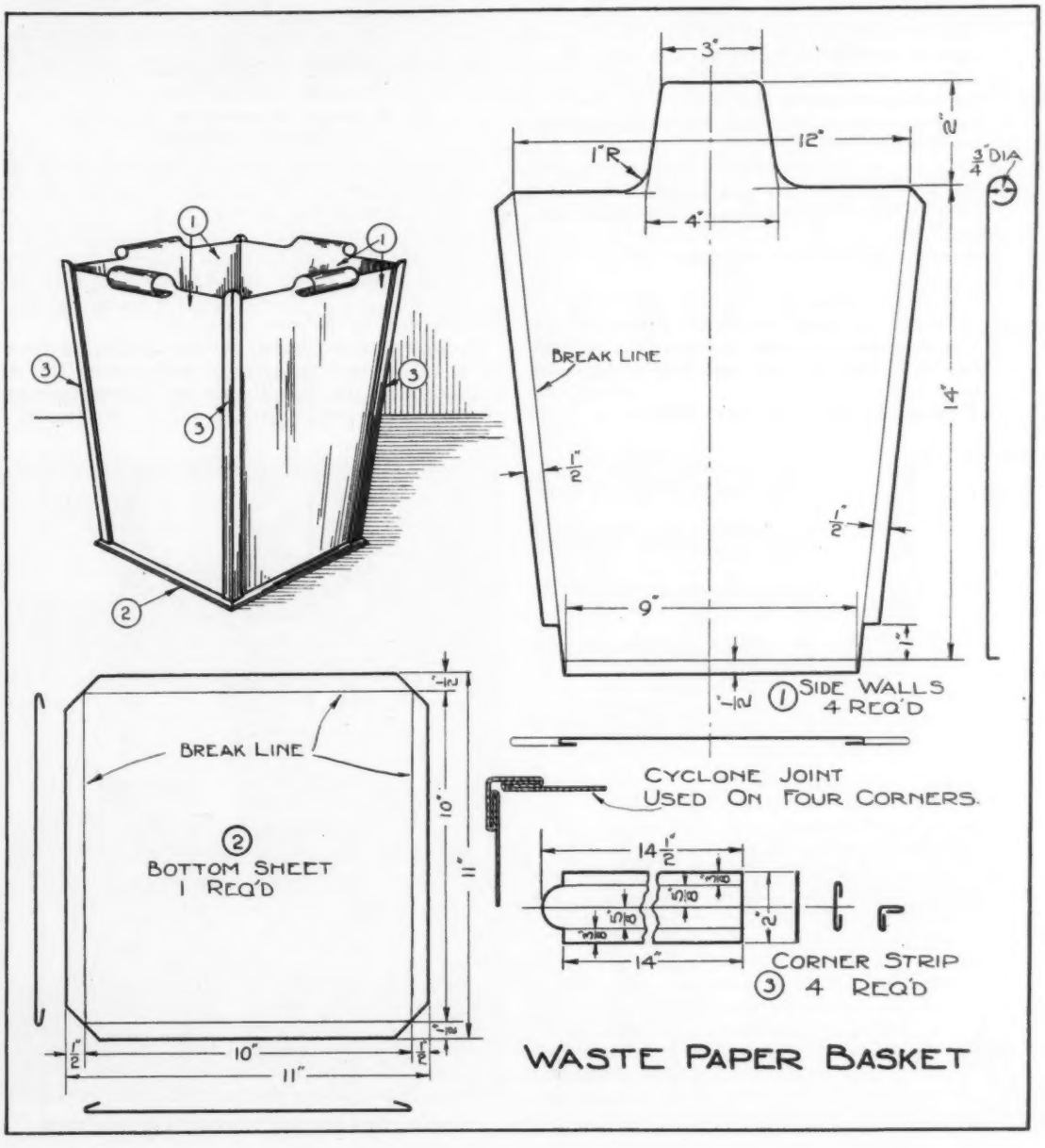
Cut No. 26 gauge black iron into rectangular pieces of the required size for each part. Refer to the material list for this size information.

Material List

Part	*No. Req.*	*Name of Part*	*Thickness*	*Width*	*Length*
1	4	Side Walls	No. 26 Ga.	13 in.	16½ in.
2	1	Bottom Sheet	No. 26 Ga.	11 in.	11 in.
3	4	Corner Strips	No. 26 Ga.	2 in.	14½ in.

B. Lay Out Form and Break Lines for Each Piece.

1. Side Walls. (Follow Detail No. 1.)
   - *a*) Scribe center line lengthwise of each sheet.
   - *b*) Scribe break line across one end.
   - *c*) Measure along the break line half the width of the bottom end of the side wall in each direction from the center line.
   - *d*) Measure 14 in. from the break line along the center line.



e) At the point just located, measure half the width of the top each way from the center line.
f) Scribe on the side break lines.
g) Allow ½ in. outside the side break lines for the corner joints.
h) Scribe on the side cutting lines.
i) Show the parts cut away at each corner.
j) Lay out the extension at the top end for the roll.
k) Check layout with drawing Detail No. 1 for possible errors of size and shape.

2. Bottom Sheet. (Follow Detail No. 2.)
   a) Scribe break lines along four sides of the 2-in. square piece, ½ in. from edges.
   b) Mark corners to be cut away.
3. Corner Strips. (Follow Detail No. 3.)
   a) Scribe center line lengthwise of strip.
   b) Scribe break lines ⅜ in. from each edge of strips.
   c) Lay out the shape of the top end as shown in Detail No. 3.

C. Forming.
1. Side Walls.
   a) Trim oblique edges. Use the foot-power shear.
   b) Cut top extension to shape with tin snips.
   c) Remove all roughness from edges with a fine file.
   d) Roll top extension over a ¾-in. round rod.
   e) Set folding machine to ½ in. depth.
   f) Fold hem on two oblique sides but see that they are not completely closed.
   g) Place a waste strip of metal under the folded parts and press down to form an open hem.
   h) Break or fold bottom portion to form a square bend.
2. Bottom Sheet.
   a) Fold four edges to form open hems.
3. Corner Strips.
   a) Set folding machine for ⅜-in. hem fold.
   b) Fold along one break line. Do not close.
   c) Place a narrow strip of waste metal under the fold and press down to form open hem. Leave metal strip in place.
   d) Repeat operations *b* and *c* on opposite edge.
   e) Set folding machine to fold along center line of strip.
   f) Break to form square bend along center line.
   g) Remove metal strips.

D. Assembling.
1. Place bottom sheet (1) on the bench with hemmed edges up.
2. Hook bottom edges of two side walls (2) into the open hem of the bottom to form one corner.
3. Set corner strip (3) over the open hems of parts (1) as shown in the corner detail on the drawing, and slide part way down.
4. The remaining side walls can be set up in a like manner, with the corner strips part way down.
5. Tap lightly the top of first one corner strip and then another, with a wood block, until they have been driven down against the bottom sheet.

E. Finish.

It is always desirable to make a trial assembly before decorating the basket.

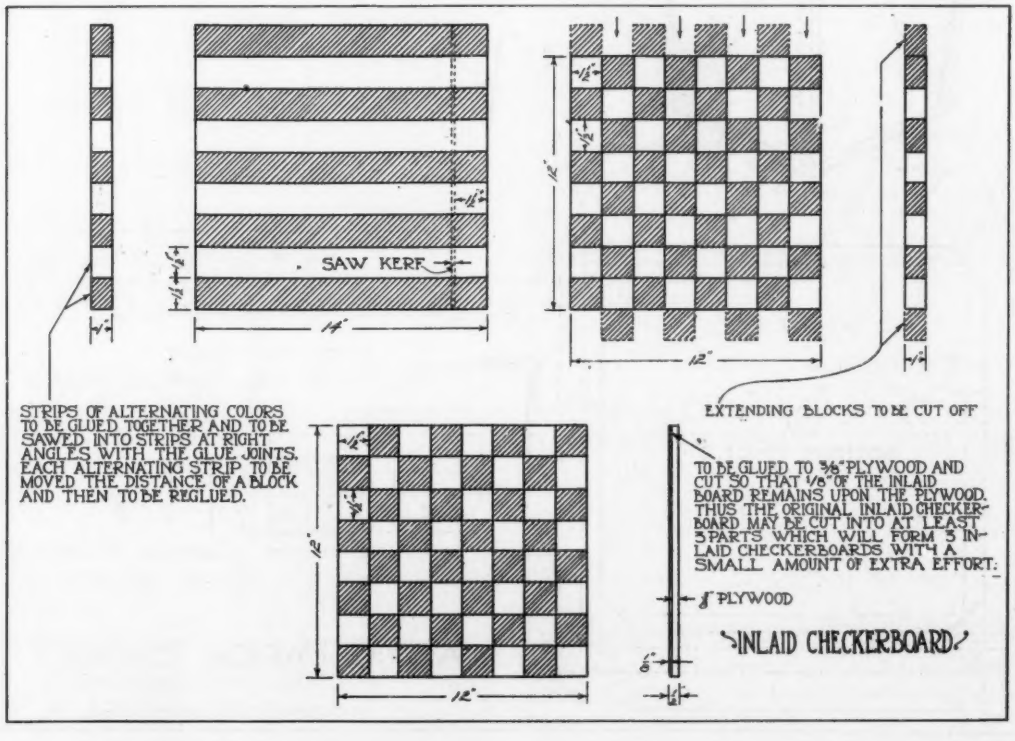
1. Remove the corner strips and take the basket apart.
2. Apply any desired scheme or decoration.
3. Permit parts to dry thoroughly.
4. The basket may then be reassembled ready for use or wrapped in a flat bundle for shipment.

INLAID CHECKERBOARD

Paul N. Wenger, Supervisor of Manual Arts, Greenwich, Connecticut

The inlaid checkerboard, shown in the accompanying illustrations, is suitable for the more advanced students in shopwork. It is essential that the work is done very accurately and that the dimensions are followed with great precision; otherwise, the blocks will not match properly and the appearance of the finished project will be greatly marred. To insure greater accuracy in its construction, the sawing and planing should be done on the power machinery.

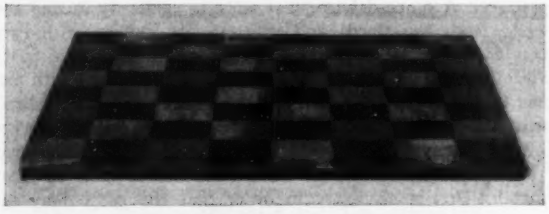
By using stock that has a thickness of 1 in., the material will be sufficiently thick so that it can be cut to form three inlaid checkerboards. Thus, if each one of three students decides to make a checkerboard, it will be advantageous for


SAW KERF
14"
12"
STRIPS OF ALTERNATING COLORS TO BE GLUED TOGETHER AND TO BE SAWED INTO STRIPS AT RIGHT ANGLES WITH THE GLUE JOINTS. EACH ALTERNATING STRIP TO BE MOVED THE DISTANCE OF A BLOCK AND THEN TO BE REGLUED.
EXTENDING BLOCKS TO BE CUT OFF
TO BE GLUED TO ⅜" PLYWOOD AND CUT SO THAT ⅛" OF THE INLAID BOARD REMAINS UPON THE PLYWOOD. THUS THE ORIGINAL INLAID CHECKERBOARD MAY BE CUT INTO AT LEAST 3 PARTS WHICH WILL FORM 3 INLAID CHECKERBOARDS WITH A SMALL AMOUNT OF EXTRA EFFORT.
⅜" PLYWOOD
INLAID CHECKERBOARD

them to work together at the one. After the piece, with a thickness of 1 in., is finished, a piece of plywood ¾ in. thick, may be glued to each of the two faces. After sawing the piece so that ⅛ in. of the inlaid sections remains upon the plywood, each student may plane and finish his own checkerboard. Thus the original article (unless the saw kerf is too wide), will form three inlaid checkerboards, each with a plywood back.

Because there are so many glue joints, it is wise to select stock that is well seasoned and not extremely hard. Poplar and gumwood were used in making the one that is shown herein. This combination forms a sharp contrast of colors; and, due to the texture of the wood, it is easy to work.

To make this checkerboard, glue up 9 strips, alternating in color, (4 of one color and 5 of another color) that are 1 in. thick, 1½ in wide, and 14 in. long; and allow them to dry.



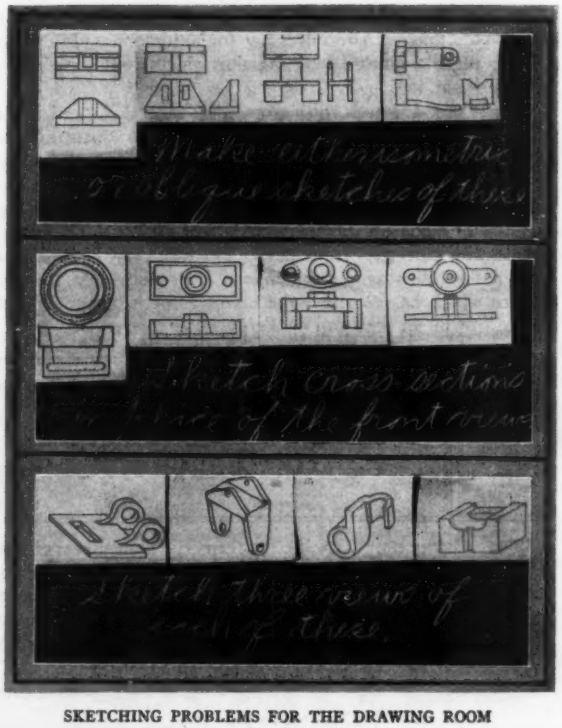
Saw the strips perpendicular to the glue joints so that they will be 1½ in. wide when finished. Move each alternating strip 1½ in. (the size of each block), reglue, and allow to dry. This will give it the checkered appearance. Cut off the extending blocks, plane each surface, glue to plywood, and saw so that the thickness will form three inlaid checkerboards.

A large border may be placed around it so as to form the top of a table; or, if used as shown in the photographs, the bottom may be covered with felt. A natural finish is desirable.

A DEVICE FOR TEACHING DRAWING

H. H. Robinson, Augusta, Kansas

Every teacher of mechanical drawing knows the value of free-hand sketching drills in the teaching of visualization.



SKETCHING PROBLEMS FOR THE DRAWING ROOM

Realizing that drill requiring visualization is important, the question arises what devices and methods are to be used in presenting the problems to a class.

The writer has found the following very helpful: Each problem that was to be used for these sketching exercises was drawn on an 11 by 15-in. piece of drawing paper. A heavy speed-ball pen was used to make the drawings so that they could be seen easily across the room. As this work was all done free-hand, it did not prove much of a task to prepare the hundred or more problems that make up the set.

To present the drill exercises, the desired problems are placed before the class. Answer sheets for all of these sketching problems also have been prepared and after each drill period is over the answer sheet is put up, so that the students can check their own or a neighbor's work before the grades are given. Making the answer sheets doubles the supply of problems on hand, because the sheet that would give the answer when orthographic views are required, may later be used as the problem sheet when an isometric sketch is required.

ELEMENTS OF JOB COMPOSITION—II

Frank P. Rich, Roxbury Memorial High School, Boston, Massachusetts

Type Arrangement

The shapes into which we arrange groups of type may make or spoil their appearance from an artistic point of view. A type-group may possess grace or it may be awkward and stiff.

A SQUARED GROUP

A CAREFULLY SQUARED TYPE-GROUP
IN WHICH ALL LINES ARE EQUAL
IN LENGTH AND SET IN CAPITALS
makes a very pleasing form when the copy
can be so arranged.

Type arrangements that are neither squared, nor have a distinct difference in length of alternating lines are "bunchy" and awkward, and for these reasons are not pleasing. They seem to have been arranged with no definite plan in view.

LINES OF ALTERNATING LENGTH FORMING AN INVERTED PYRAMID

Lines of italics or lower case set in long and short lines
provided
there is a distinct difference in the length of
alternating lines is also
pleasing

When lines are of a distinct difference in length,
the longest line should be at or near the top,
with the other lines tapering down in the
form of an inverted pyramid. This is
one of the most pleasing forms in
typography, and probably the
one most used. Its con-
verse, the pyramid,
is not pleasing.

TIE RACK

Ken. F. Shepardson, Menomonie, Wisconsin

Tie racks as a rule are a nuisance. Usually, when you want a tie, you fumble around through your collection until you find the desired one. After you find the tie, try to get it off the rack without pulling the rest of the ties along with it.

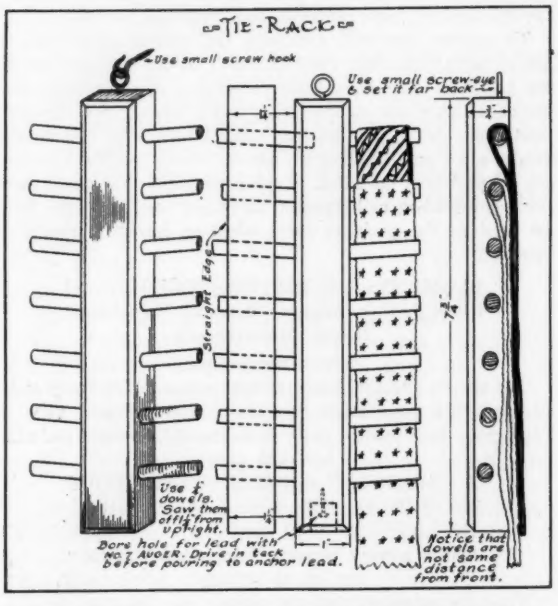
Well, here is a tie rack which is different. Enough of each tie can be seen at a glance to decide your selection for the day (see the illustration). The ties hang separately on individual pegs, thereby insuring accessibility and no wrinkles.

To take a tie off or put one on the rack, raise the bottom of the rack upward toward you, the ties will then be hanging 1 in. apart. The tie may then be removed or replaced with the other hand and the rack lowered.

In constructing the rack, slant the pegs or dowels slightly. The ties will not slip off accidently if this is done. Dowels

are closer to the front at the bottom and gradually approach the back as they go higher. This layout affords clearance for the ties above. Pegs are driven in at random lengths, marked with a straightedge and sawed off 1¼ in. from the upright. For stability, the bottom of the rack is loaded with lead.

The hook and screw eye at the top of the rack affords the proper hinge action required for the operation of putting on or taking off the ties.


TIE-RACK
Use small screw hook
Use small screw-eye & set it far back
Straight Edge
Use ¼ dowels. Saw them off ¼ from upright.
Bore hole for lead with No. 7 AUGER. Drive in tack before pouring to anchor lead.
Notice that dowels are not same distance from front.

The rack may be lacquered or enameled in colors if pine or other soft wood is used. The bevel and ends of dowels may be trimmed a darker shade than the body and dowels.

The rack affords a good fundamental problem in squaring up, laying out, beveling and boring, besides being practical.

NOW, Are There Any Questions?

Archery Tackle

942. Q.: Can you advise us where we can get beefwood for arrow footing? Our manual-training boys are interested in this work and are desirous of finding this material to foot arrows.—*M. R. K.*

A.: Beefwood is a rather indefinite term, half a dozen or more woods being sold under that name. Several of the big lumber companies are selling enough so-called beefwood to manufacturers of archery tackle to insure the amateur getting something that is useful.

Beefwood can be had from Monteith, New York City, and from the Tropical Hardwood Lumber Company, Huntington Park, Calif. It is possible that the Indiana Quartered Oak Company of Indianapolis, Ind., also carries the material. It is especially necessary to obtain seasoned stock, and in ordering to insist that seasoned stock shall be shipped.

If it is difficult to obtain beefwood, any of the following woods may be used: purpleheart, greenheart, vine maple, lemonwood, tindalo, laurel, and Osage orange. For that matter, any wood that is tough, hard, and glues well, may be used. Purpleheart and Osage orange should be doped with a 10- or 15-per-cent solution of caustic soda before gluing as should also Port Orford cedar which is frequently used for shafts.

It is desirable not to purchase too large a supply of beefwood at one time.—*C. W. Frost.*

Putty for Holes and Cracks

943. Q.: Would you kindly advise as to the best method of filling nail holes and cracks when using a water stain on a wood project? The water stain refuses to take on ordinary fillers, putty, sawdust and glue, plastic wood, or gesso, hence the filled indentations always show in the finished project.—*G. G. V.*

A.: After thoroughly testing out many formulas for putty, plastic wood, water putties, etc., I have yet to find one which will take the stain in such a manner that it resembles the surrounding wood; this in spite of advertising to the contrary. The old fundamental practice of staining the wood, drying, shellacking with a pound and a half or two-pound cut, and then making up a match putty still remains the most practical. A quick-drying putty may be made by mixing dry white lead, one third; and whiting, two thirds; with two-pound cut shellac to a smooth consistency under the putty knife. This material must then be shaded to match with pigment colors in oil or if even greater speed in drying is desired, with dry pigment colors. The materials should be well worked with a knife on a glass plate until smooth and well blended, and the final color should be a trifle darker than an exact match. This is necessary in order that the patch may not appear light beneath the finish. For glazing purposes the flexible putty knife should be used, having preferably been freshly polished on a fine oilstone so that no wire or nicked edge remains on the blade. In case the shellac-bound putty adheres to the knife the latter may be given a thin film of linseed oil by being rubbed with a finger to which a drop of oil has been applied. This method, while entirely practical, calls for some skill in filling the hole neatly without smearing the surrounding surface. If the latter occurs, the excess material may be successfully removed with a cloth that has been slightly dampened with denatured alcohol. After the putty has dried hard, the entire job may be sanded with a split 6/0 paper. After this the filler or varnish may be applied as the case demands. — *Ralph G. Waring.*

Top Dressing

945. Q.: I would like to have information regarding the process for making a top dressing for automobiles. Is it possible to make a quick-drying dressing which would cover well in a one-coat job? — *J. C. B.*

A.: While I can furnish you with several formulas for making auto-top dressings, yet the minimum quantities of materials which you could buy as well as the labor and technique involved in their mixing would serve to make this impracticable. It is far better to buy a standard oil-type top dressing as made by Pratt & Lambert or DuPont. These materials are correctly formulated, in that they contain the proper flexibility agents which are very necessary for the service which has to stand the extremes of exposure typical of the life of an auto top. — *Ralph G. Waring.*

Among the Industrial-Arts Teachers

¶ Dr. Lawrence Wade Bass, formerly a member of the staff of Mellon Institute of Industrial Research, Pittsburgh, Pa., has accepted the position of assistant director of research of the Borden Company, New York, N. Y. Dr. Bass is a graduate of Yale University and was at one time an associate in the chemistry division of the Rockefeller Institute for Medical Research. Dr. Bass has made a number of important con-

(Continued on Page 26a)

The *most* "boy proof" Bit Brace

THE redesigned Stanley Bit Brace No. 919 is equal to the trying conditions of the school shop. There is no part that can be easily removed and lost. The entire chuck including the jaws is locked in place with a nut and cotter pin.

This bit brace is intended only for the square taper shanks common to auger bits, and therefore answers ninety per cent of the needs of the school shop.

Simply drop the bit into the square socket. This socket takes the driving strain and centers the bit automatically.

Cocobolo head and handles. Handle collars securely anchored. Head revolves on a bronze bushing and ball bearings. Sturdily constructed ratchet. Made with 6″, 8″, 10″, 12″ and 14″ sweeps.

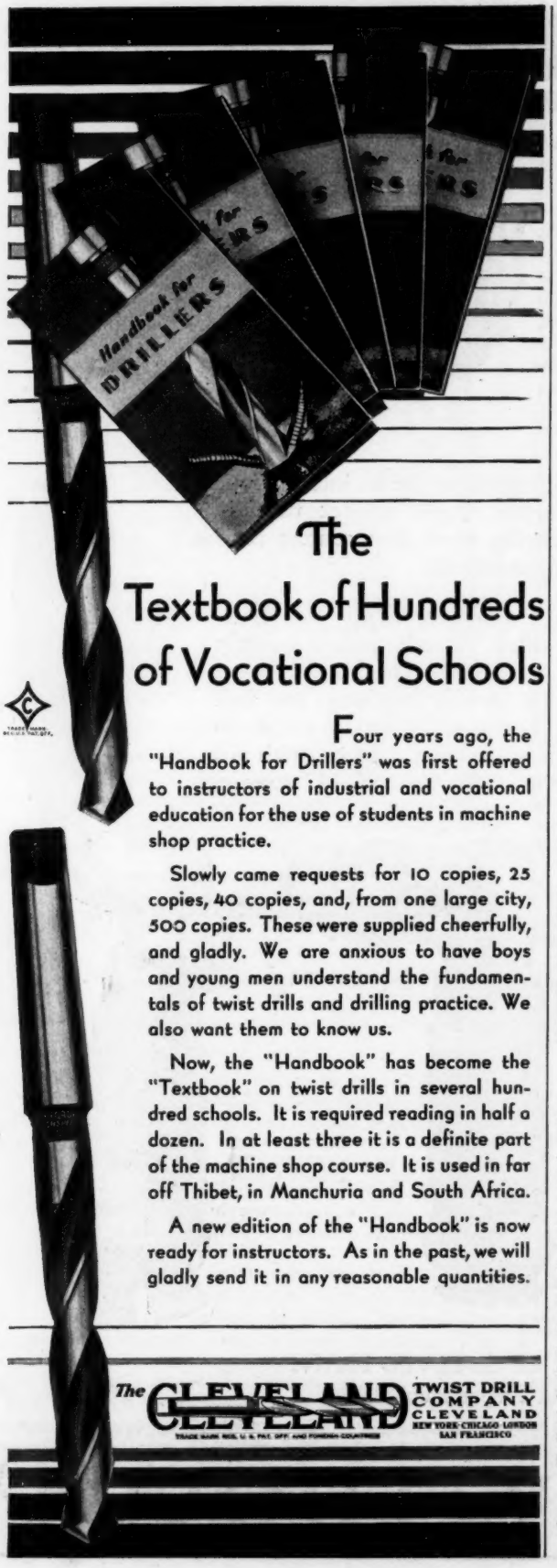
Complete description gladly sent upon request

Nut and cotter pin lock the entire chuck (including jaws) in place

Square socket centers and drives bit. Jaws cannot jam, slip or come out

THE STANLEY RULE & LEVEL PLANT
Educational Department
New Britain, Conn.

STANLEY TOOLS


Handbook for DRILLERS
The Textbook of Hundreds of Vocational Schools
Four years ago, the "Handbook for Drillers" was first offered to instructors of industrial and vocational education for the use of students in machine shop practice.
Slowly came requests for 10 copies, 25 copies, 40 copies, and, from one large city, 500 copies. These were supplied cheerfully, and gladly. We are anxious to have boys and young men understand the fundamentals of twist drills and drilling practice. We also want them to know us.
Now, the "Handbook" has become the "Textbook" on twist drills in several hundred schools. It is required reading in half a dozen. In at least three it is a definite part of the machine shop course. It is used in far off Thibet, in Manchuria and South Africa.
A new edition of the "Handbook" is now ready for instructors. As in the past, we will gladly send it in any reasonable quantities.
The CLEVELAND TWIST DRILL COMPANY CLEVELAND
NEW YORK-CHICAGO LONDON SAN FRANCISCO

(Continued from Page 196)

tributions to the literature of photochemistry, stereochemistry, chemical economics, and industrial research.

¶ Dr. Leonard H. Cretcher has recently been appointed to an assistant directorship in the Mellon Institute of Industrial Research at Pittsburgh, Pa. Dr. Cretcher, who has been serving as head of the Institute's department of research in chemistry, is a specialist in organic chemistry, and will have charge of industrial scholarships dealing with problems in organo-chemical technology. He is a graduate of the University of Michigan and Yale University, and has been a member of the staff of the Mellon Institute since 1922.

¶ Mr. Homer LeFevre has been appointed as head of the printing department at Springfield, Ohio, succeeding the late J. F. Dittman.

¶ Mr. Earl L. Bedell, of Detroit, Mich., was recently elected president of the Detroit Schoolmen's Club. This is the first time that a vocational man has ever been elected to the office.

¶ Mr. Earl Bishop, of Tallahassee, Fla., is teaching mechanical drawing in the high school, Dennison, Tex.

¶ Mr. M. C. Stone has succeeded Mr. C. C. Rigney as director of trades and engineering at the North Texas Agricultural College. Mr. J. P. Wright has become instructor in welding in the trades department, while Mr. M. W. Joy is assistant in the electrical department.

¶ Mr. John O. Judge, formerly of Uniontown, Pa., has been appointed as an instructor in the schools of Pittsburgh. He will have charge of the prevocational work in the south high school.

¶ Mr. George F. Billey, formerly of Ellendale, N. Dak., has recently become instructor in the vocational-education department of the public schools of Detroit, Mich.

Mr. Billey, who is a native of North Dakota, received his education in the schools of that state. He is a graduate of the State Normal and Industrial College of Ellendale, and also completed postgraduate work at the City College in Detroit. In 1929–30, he was elected vice-president of the manual-training division of the North Dakota Education Association. He is a frequent contributor to the periodical literature on industrial-arts subjects.

Association and Convention News

BOSTON VOCATIONAL SOCIETY MEETS

The Vocational Education Society, of Boston, held its regular monthly meeting on Saturday, March 14, at the Hotel Westminster, Boston.

The speaker, Mr. Abraham Krasker, of Boston University, talked on "Visual Education." He pointed out the need for having the teaching given in the schools as near lifelike and realistic as possible, and emphasized that the aim of education is to prepare one for life and that the schools should train for self-education. He advocated a liberal use of the visual aids to supplement and enrich the school instruction and urged the use of lifelike material and methods. He showed how the camera brings the world closer to the learner and how visual aid supplements the regular teaching method. Mr. Krasker illustrated his talk with demonstrations of some of the visual aids, including slides and films especially adapted to classroom use. He also showed the difference between classroom display and the auditorium display as part of a visual-education program. — *Louis A. Van Ham.*

SCHOOL CRAFTS CLUB MEETING

The March meeting of the School Crafts Club of New York City was held in New York, with an attendance of 45

(Continued on Page 28a)

REGAL
BUILT BY LE BLOND

SAFEGUARDING the STUDENT

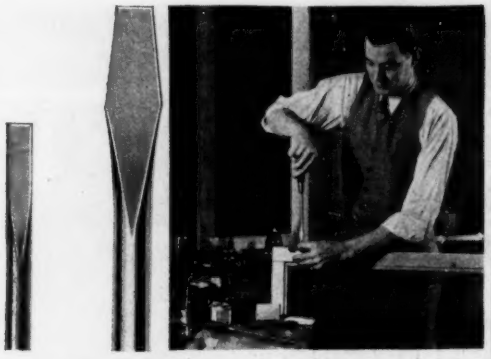
SAFETY is pre-eminent in the construction of this Regal lathe built by LeBlond—and sold under the LeBlond guarantee. All moving parts are enclosed. Dangerous overhanging shafts are eliminated. An eight-speed selective geared head permits safe and simple changing of speeds and feeds. It is a self-contained motor-driven lathe that will appeal to the instructor and the student. Its unusual precision and accuracy are typical of the LeBlond lathes used in the leading industrial shops. Made in five sizes, and sold on easy terms if you wish. Write for illustrated descriptive literature.

SEE OUR DATA IN BRUCE'S SCHOOL SHOP ANNUAL 1931 EDITION

Sizes:
10" . . . 18"

Prices:
$388 . . . $947

The R.K.LE BLOND Machine Tool Co.
Cincinnati, Ohio, U.S.A.



A TOOL *that can't be too good*

True, isn't it, that you reach more often for a screw-driver . . . use it in more different ways . . . give a screw-driver more abuse, than any other tool?

Pay a few cents more: get a genuine "Yankee"—a screw-driver you can depend on like a friend.

A tool with balance and comfort grip that make work easier.

And with a blade that can't be loosened in handle, and won't twist, crack, break, or bend on the edge.

"Yankee" blades are forged from special steel, tempered to stand up in the work a screw-driver has to do.

And every blade, of every "Yankee" Screw-driver, is individually tested and twice tested at factory before delivery to dealer for you.

In your interest, "Yankee" toolmakers insist that a screw-driver can't be made too good! Ask dealer for

"Yankee" Vise No. 1993

Removable from base for holding work on drill-press or other machines. True all sides. Jaws open 3⅛ in. Price, $9.90. Other sizes, $3.75 up.

"Yankee" Plain Screw-drivers

No. 90.—Standard Style: Fifteen sizes, 1½" to 30" blades. Price for 5" blade, 50c; 6", 55c; 7", 65c; 8", 75c; 10", 95c.

No. 95.—Cabinet Style: Eleven sizes, 2½" to 15½" blades. 4½" blade, 40c; 5½", 45c; 6½", 50c; 7½", 60c; 8½", 65c.

"YANKEE" TOOLS

MAKE BETTER MECHANICS

NORTH BROS. MFG. CO., Philadelphia, U. S. A.

You may send "Yankee" Tool Book (offered in Industrial Arts) Showing Spiral and Ratchet Screw-drivers, Automatic Push Drills, Ratchet Braces, Socket Bit-Extensions, Ratchet and Plain Breast and Hand Drills, Automatic Chain and Bench Drills, Ratchet Tap Wrenches, Continuous-Work Swivel Vises, Plain Screw-drivers, Etc.

(Please clip and write name and address in margin below)

(Continued from Page 26a)

members. Many members were present from Connecticut, Pennsylvania, New York, and New Jersey.

The meeting was opened with an address by Mr. Frederick Launders, of New York University, on "Modern Trends in Education," in which he spoke freely of the articulation of industrial arts with the subject matter in school and life. He commented on the modern trends of the manufacturer and the lower ideals in manufacturing, and expressed the hope that the industrial-arts leaders would train boys and girls to a keener appreciation of good furniture which would overcome the new attitudes of the manufacturer. In conclusion, he listed as modern trends the stressing of industrial arts, the care of leisure, club activities, surveys, realization of the relations of the arts, academic, and shopwork, and the enlisting of helps through visual aids.

The second part of the program consisted of four round tables. Mr. A. H. Fewart, of New York, conducted one round table on the care of woodworking machinery and safety devices. The second round table was in charge of Mr. H. L. Gaul, who presented material on related work in industrial arts. Mr. Harold Feuerstein was in charge of the third round table, in which he presented routine problems in the junior high schools. The fourth round table was in charge of Mr. William C. Woods, Jr., who presented material on models, jigs, job sheets, and the making of projects in metal. He distributed printed matter, plans, and job sheets on work which he had developed in his classes.

At the business meeting, Mr. Asher, president, was appointed to attend the Eastern Arts meeting at Atlantic City in May. The October meeting has been resumed after a lapse of a few years.

Plans are being completed for the April meeting. — *Arnold M. Hess.*

MICHIGAN INDUSTRIAL EDUCATION SOCIETY CONVENTION

The annual meeting of the Michigan Industrial Education Society was held with the vim, vigor, and vitality common to this organization, on March 19 and 20 at the Book-Cadillac Hotel, Detroit.

Those who attended could not fail to be impressed with the earnestness of this group of men who were meeting in order to thoughtfully discuss their problems and to coöperatively work out ways and means for taking care of their work in a better and more efficient way.

The industrial tours and opportunities for school visits were not only well planned but also well patronized. To describe all of the worth-while things that were offered in general sessions, at the dinner meetings, and in the sectional gatherings is beyond the possibilities of this article. The trend of all activities, however, might be summed up in the words of A. C. Tagg, president of the organization, "To find better ways of teaching the industrial subjects, and to take advantage of every opportunity to better serve education, both in the field of industrial and academic work."

At the dinner on Saturday, March 21, the earnest, unselfish work of Earl L. Bedell, secretary-treasurer of the organization was recognized in a fitting manner when President A. C. Tagg presented him with a life membership in the Michigan Industrial Education Society.

The importance of the commercial exhibits was demonstrated by the steady stream of visitors found in the exhibit hall at all times. The "Ship" awards were made by John Claude, of the Bruce Publishing Company, at the Saturday afternoon meeting.

The new officers for the coming year are:

President, Marshall Byrn, University High School, University of Michigan, Ann Arbor; vice-president, H. H. Harrison, director of manual arts, Marshall, Mich.; and secretary-treasurer, A. H. Meyer, board of education, Grand Rapids.

(Continued on Page 30a)

Catalogs for your classes
The Starrett Catalog describes over 2500 tools and shows how to use them. If he's interested in tools, a boy can learn a lot from it. If he's not, a Starrett Catalog may *get* him interested.
At your request, we will send you Catalogs to supply your classes. Use the coupon.
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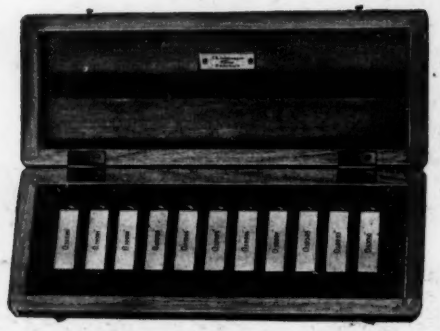

Auxiliary Gage Block Set No. 19 consists of 11 blocks
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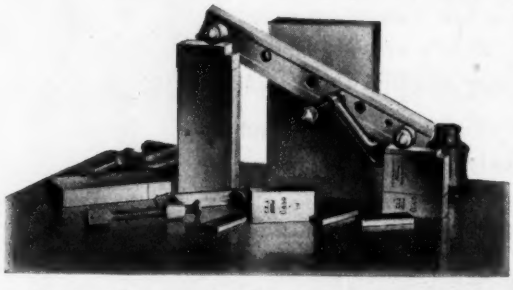
AUXILIARY Set No. 19—Johansson Gage Blocks —was designed for the manufacturer, whose degree of accuracy on dimensions of length is less than one ten-thousandth part of an inch.

This set in conjunction with a gaging system gives the manufacturer a positive method of measuring within a ten-millionth part of an inch.

Flexibility is only one of the many reasons for using Johansson Gage Blocks and Accessories as your standard measurement of length.



Gaging System, Set No. 1 — Johansson Gage Blocks containing eighty-one different size gage blocks will make one hundred twenty thousand different size gages. Using Auxiliary Set No. 19, containing eleven different size gages, in conjunction with set number one, the number of different size gages will be increased to one million three hundred twenty thousand. All of which will be accurate within a very few millionth parts of an inch. A most flexible, accurate and economical gaging system. Available in three accuracies. Delivery from stock.

Prices and literature on application — order direct or through your mill supply dealer

C. E. JOHANSSON, *Inc., Division of*

FORD MOTOR COMPANY

Detroit, Michigan

(Continued from Page 28a)

ANNUAL DINNER OF OSWEGO NORMAL BOYS

The thirty-first annual dinner of the Oswego Normal Boys' Club was held on Saturday, March 7, in New York City, with President Harold J. MacDonald in charge.

At the dinner brief talks were given by Dr. James G. Riggs, principal of the Oswego Normal; J. C. Park, head of the industrial-arts department; Dr. W. Baldwin; Dr. G. E. Webster; and Dr. Brownell. Interesting letters were read from various Oswego boys who were unable to be present in person.

Door prizes were awarded to Edward Poole, Arthur Conrad, and Fred Carey. Among the 98 guests were graduates of the Normal from Elizabeth, Schenectady, Albany, Jersey City, Newburgh, and Syracuse.

President MacDonald told how the club was founded in New York and how, as a club, the opinions of the members on school matters have weight. Dr. Riggs told about the advancement made at Oswego, both in the normal school and in the city, and explained the plan of adding to the Normal within the next ten years. J. C. Park talked on the changes which have come since he first came to the Normal. Dr. Ned H. Dearborn, of New York University, talked on teachers' ideals and urged that the members place the real value of teaching above monetary values. Tribute was paid departed members of the club during the past year when the president called for one minute of silence. The club has lost seven members by death.

The officers elected for the coming year are: Mr. Harold J. MacDonald, of Oswego, president; Mr. Joseph Bonacci, of New York, first vice-president; Mr. T. V. Hopkins, of Jersey City, second vice-president; Mr. John F. Faber, of New York, third vice-president; Mr. William M. Davis, Astoria, secretary; Mr. Glenn Whitcomb, New York, assistant secretary; Mr. Kenneth W. Hunter, White Plains, treasurer; and Mr. Kenneth Little, Rockville, Conn., assistant treasurer.

THE WESTERN ARTS PROGRAM

The Western Arts Association will hold its annual meeting April 28 to May 1, at the Brown Hotel, Louisville, Ky. Mr. C. H. Bailey, chairman of the program committee, has announced the tentative program for the meeting.

The Program

Tuesday, April 28

Greetings, Mr. R. E. Daugherty, supervisor of industrial arts, Louisville, Ky.

Address, Mr. T. T. Lindsay, Peabody College for Teachers, Nashville, Tenn.

Address, Mr. Towne R. Abercrombie, Washington Junior High School, Cincinnati, Ohio.

Address, Dr. Charles L. Spain, deputy superintendent of schools, Detroit, Mich.

Summary of papers, Mr. John J. Metz, Editor, Industrial Arts and Vocational Education Magazine, Milwaukee, Wis.

Election of Officers

Friday, May 1

Art in Industry, Mr. H. B. Nash, Standard Sanitary Mfg. Company, Louisville, Ky.

What is Wrong with the Drawing, Mr. J. H. McCloskey, director of technical work, Lakewood, Ohio.

Reports of the research committees.

Summary, Dr. W. T. Bawden, Peoria, Ill.

The Sectional Meetings

Art and Manual Training:

Discussion of Art Principles Applied to Manual-Arts Projects, Mr. Alfred G. Pelikan, director of art, Milwaukee, Wis.

Discussion led by Jane Betsey Welling, Detroit Teachers' College, Detroit, Mich.

Art and Printing:

Fine Arts and the Printer, Mr. Harry L. Gage, Mergenthaler Linotype Co., New York City.

(Continued on Page 33a)

ADVERTISING PAGES REMOVED

(Continued from Page 30a)

Printing: Mr. L. L. Gore, Nashville, Tenn., chairman.

Educational Aspects of Printing, Mr. Harry L. Gage, Mergenthaler Linotype Co., New York City.

The Story of the 1930 Book of Art Printing, Mr. T. E. Dunwody, Pressmen's Home, Tenn.

Sidelights on European Printing, Mr. Logan Anderson, The Lakeside Press, Chicago, Ill.

The Printing School and Art Education, Miss E. M. Lowell, principal of Ahrens Trade School, Louisville, Ky.

SOUTHEASTERN INDIANA TEACHERS FORM ASSOCIATION

The industrial-arts teachers of Southeastern Indiana have formed an association to foster the ideals of its members and to promote the industrial-arts activities. Similar organizations have been formed in Bloomington and Lake counties.

School Shop Equipment News

For the Supervisor or Teacher who desires to keep abreast with news of new Machinery, Tools, Supplies, etc.

NEW SYRACUSE BELT SANDER AND GRINDER

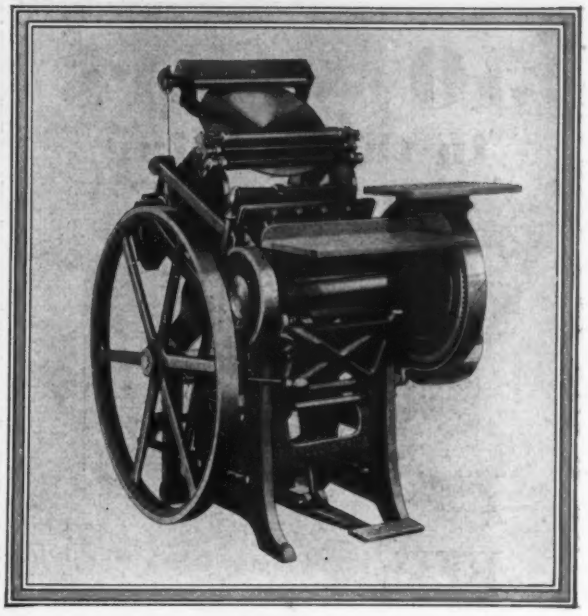
The Porter-Cable-Hutchinson Corporation, of Syracuse, New York, has announced its new Type B-9 Syracuse belt sander and grinder, a versatile machine adapted to a variety of uses in school shops. The new machine is portable, capable of instant readiness for motor-driven machinery, and is especially suitable for producing a straight-grain finish on metal, wood, fiber, bone, celluloid, and bakelite.

The Type B-9 sander is a two-speed machine, so equipped that the proper surfacing speed for wood or metal is obtained. It can be used either in a vertical or horizontal position as required, by simply loosening two wing screws. For the horizontal position a special edging guide is provided which clamps in place on the table.

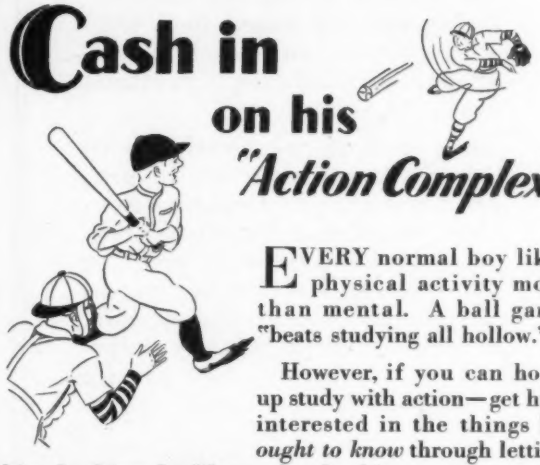
The sanding or grinding bed may be adjusted in or out, to give the correct surface tension to the belt, and to allow the use of a felt cover for flexibility; or the bed may be removed entirely for slack-belt sanding. Compound angles may be quickly obtained by tilting the table, which is graduated 45 degrees up and down.

A special feature of the Type B-9 sander is a vacuum dust-collecting system, which is built into the machine. A vacuum fan is located in the lower dust chute, which is driven

(Continued on Page 34a)



Cash in on his "Action Complex"



EVERY normal boy likes physical activity more than mental. A ball game "beats studying all hollow."

However, if you can hook up study with action—get him interested in the things he *ought to know* through letting him do things he *likes to do*—let him experience the practical, every day fruits of study—then you *can cash in on his action complex.*

Let us use this method to cultivate in him the principles of good taste and design; to ground in him the fundamentals of language and syntax and rhetoric; to instill in him a whole host of finer values, at which he might shy in the abstract.

The continuous increase of printing departments in our school system and of Chandler & Price installations in those departments is testimony to the fact that printing, directly and by indirection, serves an increasingly vital purpose in our schools. "Plenty of C & P Presses" is a good motto.

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PRESSES & PAPER CUTTERS

THE CHANDLER & PRICE COMPANY
Cleveland, Ohio, U. S. A.

50 years
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Single Manual
Training Bench

FIFTY years ago, when the world's largest department store was miniature, Welch was the name of a new company entering the equipment field with a resolution to supply high-grade, dependable, practical products.

The policy of co-operating with School Shop Executives in producing more practical and durable vocational furniture, has resulted in a steadily growing demand for Welch made goods. Two large factories and capable, experienced representatives now furnish an unsurpassed service to all parts of the world.

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(Continued from Page 33a)

by a small V belt from the drum pulley. The dust is carried through this chute into a bag by merely attaching a flexible pipe. This feature is particularly desirable in school shops where dust is a menace. This machine is equipped throughout with dustproof precision ball bearings, which are lubricated through Alemite Zerk fittings, and which insure low maintenance cost, smooth operation, and long life of the machine.

Complete information and prices may be obtained by any school-shop instructor upon request.

THE STORY OF ANCIENT ART

The Perkins Glue Company, Lansdale, Pa., in celebration of the 25th anniversary of their introduction of vegetable glue to the woodworking trade, is issuing a handsomely bound book of 95 pages in which the story of adhesives is covered from the earliest times to the present day. The reviewer does not know at what price this book is sold, but the lavishness of its make-up precludes the idea that it might be obtained gratis.

NEW BOOK ON RUG MAKING OF JANUARY AND WOOD CO.

The January and Wood Company of Maysville, Ky., manufacturers of Maysville rug filler, have issued a little booklet which contains a great deal of information about making hooked rugs, braided rugs, crocheted rugs, cross-stitched rugs, crocheted auto seats, handmade pillow tops, table covers, and frame weaving. The booklet also describes the rug filler manufactured by this company, describes how to select the proper color scheme, how to launder rugs, etc. Teachers interested in this subject may receive a copy of this booklet upon request.

NORTON CATALOG OF GRINDING WHEELS

The Norton Company, of Worcester, Mass., has issued a new catalog of grinding wheels suitable for school-shop use.

The catalog tells the story of the actual making of a grinding wheel, outlines the characteristics of these wheels, and lists and describes the various types.

Complete information and prices may be obtained by any school official, or instructor, upon request.

REISSUES POPULAR BOOKLET ON HARDWOODS

The Indiana Quartered Oak Company, 228 East Ave., Long Island City, New York, importers of Philippine hardwood known as Indoako, has just published a revised issue of "Tropical Lumber for Industrial Arts and Vocational Work."

The booklet contains an article on "Hardwoods in the Schools," which is reprinted from *Bruce's 1930 School Shop Annual*. It includes facts about Indoako, which has become quite popular with students and teachers of shopwork. The booklet offers a fine survey of the principal domestic and imported hardwoods, their characteristics, and uses.

This Company also handles other tropical woods including mahogany, Spanish cedar, teak, etc.

A copy of the booklet will be sent to any shop teacher or student upon request.

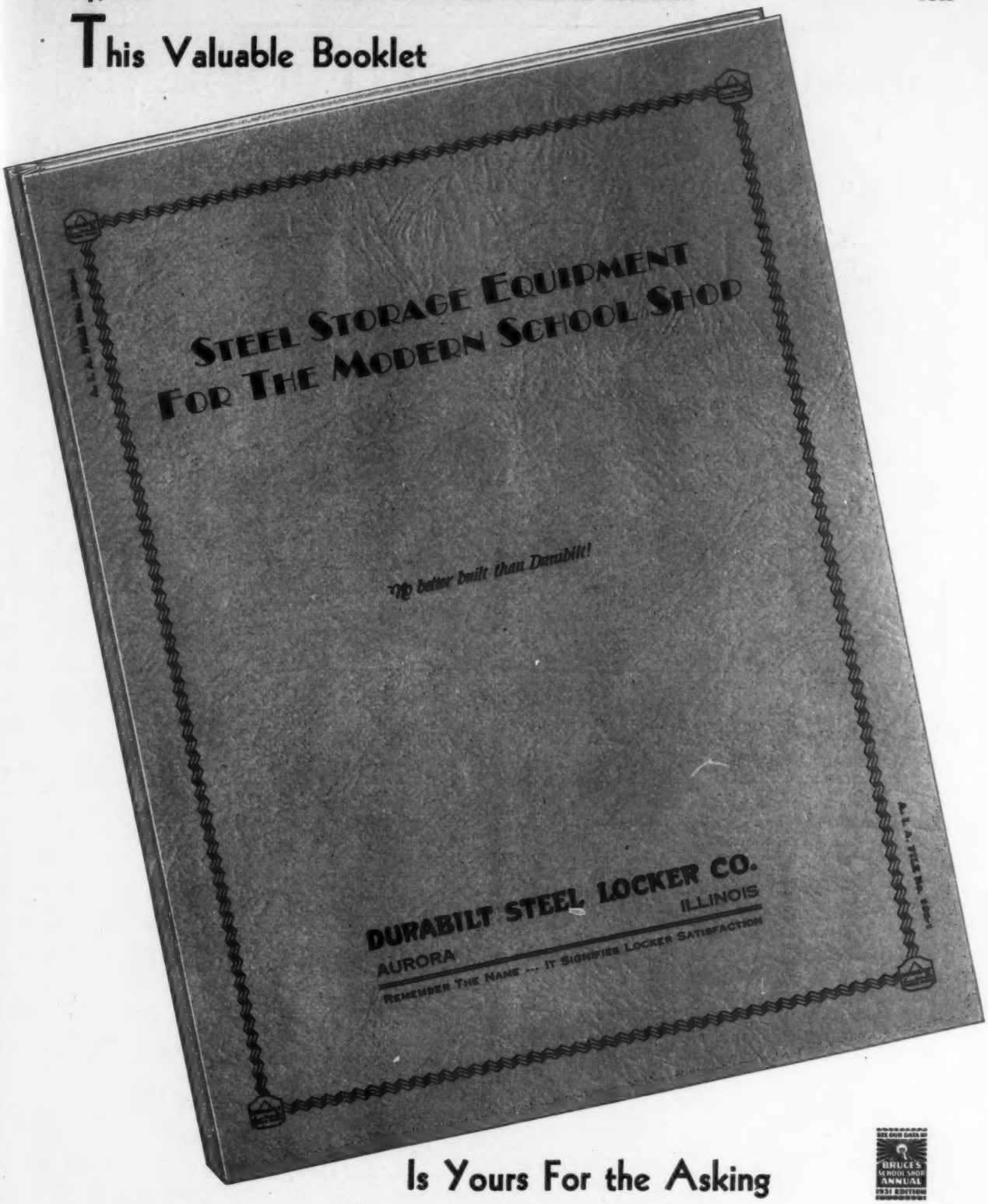
NEWS NOTES

New Vocational Board at Ft. Atkinson, Wisconsin

A vocational board of five members has been organized at Ft. Atkinson, Wis., composed of Supt. F. C. Bray, William Moore, Ralph Weber, Jay Quam, and J. A. Hagemann. It is planned to conduct a vocational school in the unused rooms of the junior-senior high school. A director will be appointed to have charge of the school and its work.

(Continued on Page 36a)

This Valuable Booklet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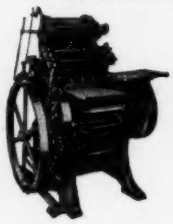

Imposing Tables

The Wanner Company

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New Equipment in Illinois, Michigan, Indiana, Columbus Territory in Ohio, Wisconsin. Rebuilt Equipment to above states and Central Territory.

(Continued from Page 34a)

Opportunity Classes at La Crosse, Wisconsin

Two opportunity classes have been opened at La Crosse, Wis., to take care of a special group of pupils who do not fit into the regular grade school.

Vocational Work Urged for Catholic Schools

Arrangements have been completed for the affiliation of the vocational-guidance department of Marquette University with the vocational-guidance department of the Milwaukee parochial schools. A combined program of instruction in Catholic schools will be undertaken under the direction of Mr. H. A. Frommelt, of the engineering department of Marquette University.

New Buildings at Dallas Vocational School

A second group of buildings for electrical courses will be erected shortly at the Southwest Vocational School, Dallas, Tex. Students from all over Texas attend this school which offers a variety of trade courses.

Vocational Guidance at Toledo, Ohio

A vocational guidance committee has been formed at the Woodward High School, Toledo, Ohio, to assist students in choosing occupations.

New Trade School Needed at Owensboro, Kentucky

The school board of Owensboro, Ky., is looking for new quarters for the boys' trade school in order to provide increased space and added facilities for a broadening of the work.

Vocational Students Repair School Clocks at St. Paul

The students of the vocational high school at St. Paul, Minn., recently repaired twenty school clocks. One group of students worked on hairsprings and truing, while another took over the fitting of pendulum rods.

Printing Course Added at Clinton, Indiana

The school board of Clinton, Ind., has added a course in printing for the high school. The equipment of a local printing establishment was purchased at a cost of $1,000.

Propose Trade School at Centralia, Washington

Plans have been discussed for the establishment of a Smith-Hughes trade school at Centralia, or some central point in southwest Washington. The institution would include a complete plant, embracing a school for the teaching of various trades, and a dormitory to house the students who would attend from the surrounding district.

Part-Time Coöperative School at Barre, Vermont

A part-time coöperative school for granite workers' apprentices has been established at Barre, Vt. The school follows the plan of the Federal Board for Vocational Education and is under the direct control of the city superintendent of schools. Apprentices are given practical instruction in the trades and the instruction is given by foremen and journeymen in the plants.

The school is operated for 44 weeks annually, beginning in September, and the term of apprenticeship is for three years. The financing of the school is also coöperative, with the funds drawn from a variety of sources, including state appropriations, local school appropriations, and federal funds. The school has a present enrollment of 40 students, who are distributed among eight different firms.

Newark School Exhibit

The teachers' association of Newark, N. J., coöperated with the local museum in the arrangement of an exhibit showing the varied hobbies, interests, and activities of the city teachers outside of school hours. The exhibit, which was held April 13–27, displayed various arts and crafts in which the teachers are interested. A large amount of material was collected for the purpose, including sculptured work, wood carving, painting and sketching, furniture designs, pottery work, rugs, and fine needlework. Groups of teachers were present to explain

(Continued on Page 43a)

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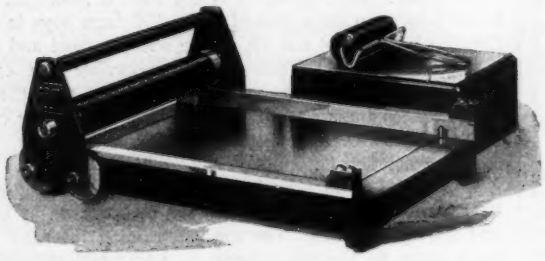
No. 0 Portable Proof Press



Especially designed for schools which cannot make a larger investment in a proof press or which desire to secure, at a low cost, a high grade printing device. This press embodies all the features of the larger Vandercook Presses. All parts are sturdy and accurately made and machined, giving a high degree of precision, accuracy and ease of operation. The polished steel top of the ink and roller box makes a very convenient ink plate. Cleaning rags and cleaning fluid can also be accommodated in this box. Two, three and four color work done with ease by means of the Register Device that comes with the machine.

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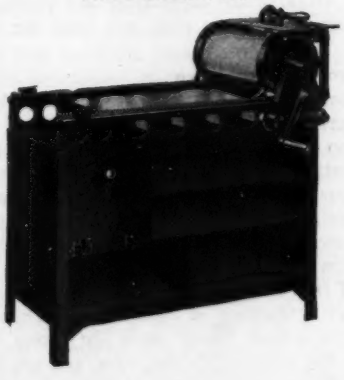

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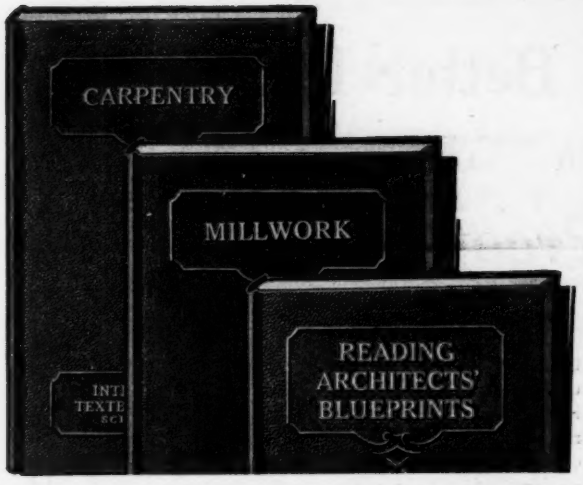

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(Continued from Page 36a)

the work to parents, children, and others who might be interested.

Ohio Develops Vocational Education

Under the direction of Mr. E. L. Heusch, supervisor of trades and industries, the Ohio state board of education is making a consistent campaign for extending vocational education in the smaller industrial communities of the state. In these small communities it would be unwise to conduct a vocational program in the schools because of the cost of equipment and teachers. The training in both the technical related subject and manipulative work of the trades and industries is being carried on in the shops and factories themselves. An apprentice coördinator in each district carries on the work and assists in the training of a plant teacher. The local school system and the industry pay the wages of the plant instructor. Systematic follow-up service by the apprentice coördinator is provided.

New Committee on Apprentice Training

The local chamber of commerce at Binghamton, N. Y., has appointed a new committee on apprentice training to work in coöperation with the industrial and vocational department of the public schools for the development of classes for the metal trades. It is planned to offer proper classroom work correlated with factory practice as a foundation for skilled apprenticeship in the trade.

High Schools Train for Farm Life

Statistics recently gathered by the Federal Board for Vocational Education show that of every 100 farm boys in North Carolina between 14 and 20, 52 are out of school and 48 are in school. Mr. R. H. Thomas, state supervisor of vocational agriculture, commenting on this, points out that the farm boys between these ages number 111,939, or 14.7 per cent of the state's entire male population. Of this number, 54,055 are attending school, while 57,884 are out of school.

Of the 54,055 in school, only one out of eleven receives training designed to prepare him for the business of farming and life on the farm. The specific training for farm life is being given by the departments of vocational agriculture in 154 high schools.

A survey of 33 counties of the state has shown that the average farm boy out of school is 18½ years of age and has an education midway between the seventh and eighth grades. Of these boys out of school, 64 per cent, or nearly two thirds, work on farms as helpers. Of every 100 boys out of school on the farm, 21 left school to help at home. Only 1 out of the 100 was graduated from high school.

Roof-Framing Class at Shawnee, Oklahoma

A class in roof framing was conducted recently at Shawnee, Okla., under the direction of Mr. H. D. Troop. The class was composed of carpenter apprentices and journeymen carpenters. A miniature house roof was used for demonstration purposes.

Oppose Proposed Legislation

The board of superintendents of New York City, is opposing proposed legislation which is designed to permit the substitution of attendance in evening high schools, for the required attendance in continuation schools. The board recently disapproved a recommendation favoring such a substitution, following a report of the special committee appointed to study the question. The committee pointed out that the continuation school is a guidance institution to determine the vocational aptitude of employed minors. To permit the substitution of attendance at evening high schools for that at continuation schools would place the choice between these schools in the hands of the employer, and not in those of the student, for the employer would demand attendance at the evening school on a threat of discharge. It was held that the welfare of the young workers requires that the determination of so vital a matter should not be left to the employer alone.

(Continued on Page 43a)

ADVERTISING PAGES REMOVED

(Continued from Page 38a)

Vocational Class at Hunter College

A thirty-hour course is being offered at Hunter College, New York City, under the direction of Mr. Sidney Lake, assistant administrative director of the board of education. The course, which emphasizes the development of industrial education, takes up such subjects as types of industrial schools, values of the practical arts, education of girls and women, the Dalton plan, and special measurements applied to vocational training, part-time schools, and vocational guidance.

Builders' Class at Manitowoc, Wisconsin

A builders' class has been established in the vocational school at Manitowoc, Wisconsin, for those employed in the building trades. The course offers instruction to journeymen, helpers, and apprentices.

Vocational Course in Chemistry at Paterson, N. J.

A course in industrial chemistry is being offered in the vocational school at Paterson, New Jersey. The course, which requires two years of study, is a prerequisite for entering students who have completed two years of high-school work. It aims to prepare boys for employment in the dyeing and other industries of the community.

New Courses at Indianapolis, Indiana

Two courses in printing and vocations have been introduced in the Shortridge High School, Indianapolis, Indiana. The printing course is open to juniors and seniors in the high school and is under the direction of Mr. O. A. Miller. The course in vocations is taught by Mr. Kenneth Peterman.

Vocational Class at New Mexico University

A course in vocational education has been opened at the University of New Mexico, under the direction of Mr. D. W. Rockey. The course, which is of primary value to those engaged in teaching industrial education, includes time provisions of the Smith-Hughes Law, job analysis, supervisory functions, salary schedules, and qualifications of teachers and coördinators.

Interior Decorating Course at Toledo, Ohio

A course in interior decorating is being offered in the evening school at Toledo, Ohio. The course takes up theory of color, balance in furniture, period furniture, and fabrics.

Urges Establishment of Arts and Crafts School in New York City

Mr. Gustav Straubenmuller, of New York City, recently issued a statement, in which he urged the establishment of a school which would appeal especially to children with aptitudes for the fine arts, including drawing, designing, modeling, pottery, and commercial art; music; literary arts, including writing and poetry; the crafts; and the sciences.

Such a school, said Mr. Straubenmuller, should be dedicated to the arts and crafts in order to develop children to become leaders in their particular lines. Only children of marked aptitudes should be allowed to enter the school. Teachers would report children displaying conspicuous talent in any particular line. Such children would be sent to an expert who would determine whether the children had decided talent. They would be trained to become successful artists in music, painting, designing, sculpturing, and crafts work.

New York Trade Educational Meetings

The vocational and extension education division of the New York State Educational Department will hold a series of special conferences for school executives during April and May, at which the problems of vocational guidance, industrial arts, and vocational education will be taken up. During April, the technical high school, the coöperative high school, apprentice training, and industrial high-school work will be discussed. On May 15, the conference will be concluded with a discussion of trade-extension classes and continuation schools. The conference offers opportunity for free discussion of the work being done in the different fields.

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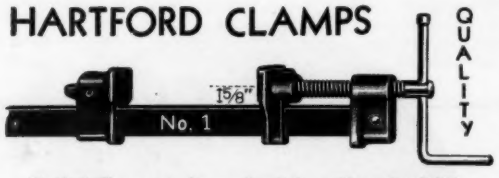

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